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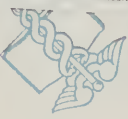


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# THE OPERATING ROOM

*INSTRUCTIONS FOR  
NURSES AND ASSISTANTS*

ST. MARY'S HOSPITAL

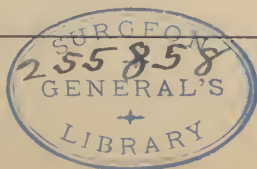
ROCHESTER  
MINNESOTA

*WITH 144 ILLUSTRATIONS*

PHILADELPHIA AND LONDON

W. B. SAUNDERS COMPANY

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## PREFACE

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THIS manual is a development of "Notes for Operating Room Nurses, St. Mary's Hospital, Rochester, Minnesota," first printed in 1920 for use in St. Mary's Training School for Nurses. In the present volume the subject matter has been revised and extended. The original purpose, however, has been kept in view, to provide the students of St. Mary's Training School with a practical guide in operating room technic as used in St. Mary's Hospital.

The methods described are those actually in use, most of them having been tested by long and successful experience. New inventions and discoveries that afford real improvement in surgical technic are readily adopted at St. Mary's Hospital as in other progressive hospitals, hence the details of the technic change, and no manual can be a stereotyped guide in all particulars for any great length of time.

ST. MARY'S HOSPITAL,  
ROCHESTER, MINNESOTA  
*April*, 1924



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# Instructions for Nurses and Assistants in the Operating Room

## INTRODUCTION

WHILE the general principles of operating room procedures are the same in all hospitals, there is much variance in minor details of method and technic. Many hospitals have perfected methods which yield splendid results to themselves, although they are entirely unsuited to other hospitals doing a different class of work, differently managed, or differently situated. Each institution must, to a certain extent, develop methods suited to its special requirements, but it may gain much by studying the methods successfully followed in other institutions. Even in the various operating rooms of St. Mary's Hospital, the technic varies slightly according to the preference of the surgeon, or the character of the work.

The methods employed at St. Mary's Hospital are presented merely as methods that are being successfully used in a hospital doing a large amount of surgical work. They have the merit of simplicity, which, in turn, implies economy in supplies, economy in time, and economy in the number of employees. "The greater the surgeon, the fewer the fads and instruments," is more than half true. The central thought at St. Mary's Hospital is to get the patient well with as little loss of time as possible; whatever contributes to this end is adopted; whatever does not, is eliminated.

Good technic is not measured by the number of assistants and nurses in the operating room, any more than is asepsis by the pile of soiled linen. The only persons in the operating room arena during an operation at St. Mary's Hospital are the patient,

the surgeon, one first and two second surgical assistants, the operating room supervisor, the anesthetist, the sterile and the non-sterile nurse. The clinic, wearing white cover-alls, occupies the gallery.

It is both unwise and unnecessary to surround the operating room with such an air of mystery that the patient is led to think it is a horrible sight and that he cannot be taken there until after



Fig. 1.—Surgical pavilion, St. Mary's Hospital.

he is asleep. The modern operating room is interesting and attractive, and a view of it will be an encouragement to the patient, especially if he expresses a wish to see it. At St. Mary's Hospital the anesthetic is administered in the operating room and the preparation of the operative field goes on at the same time. This saves from twenty to thirty minutes on each operation.

The operating rooms in St. Mary's Hospital are located on

the fifth floor of the surgical pavilion. Ten rooms, similar in all respects, are grouped in pairs with a wash-up and sterilizing room for each pair. Each operating room is two stories high, the arena

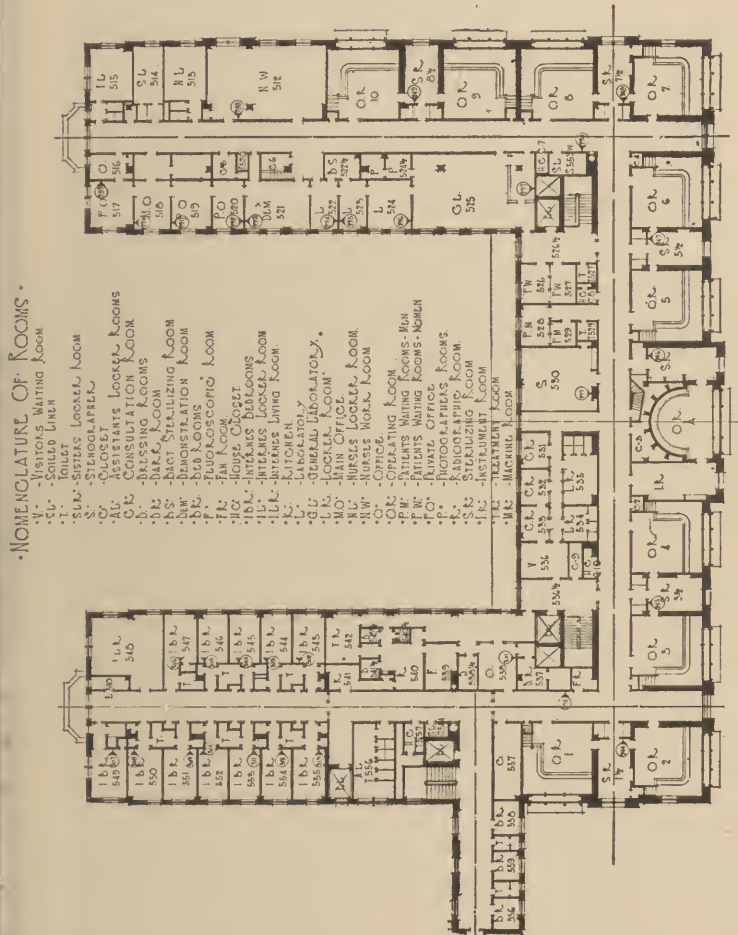


Fig. 2.—Fifth floor plan.

is 30 feet square; the floor is of gray flint tile in 2 inch units, wainscots, of tile, are 7 feet high; the seat banks and floor of gallery are of terrazzo, leaning rails are of polished white metal;

the gallery accommodates 100 persons; the visitors' entrance is on the sixth floor (Fig. 2).

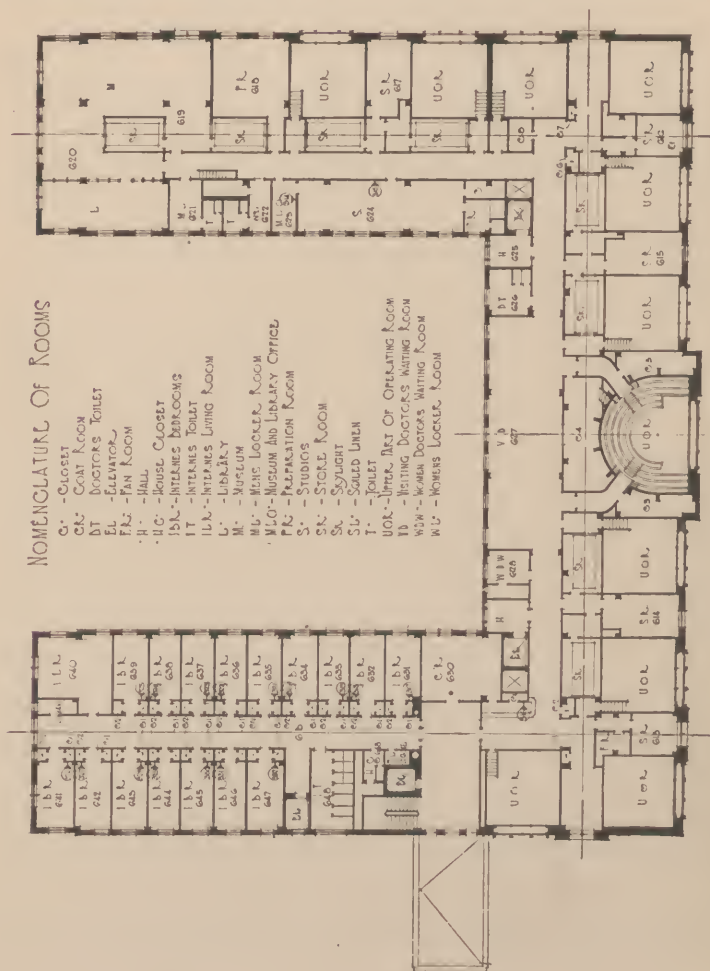


Fig. 3.—Sixth floor plan.

All the operating rooms have zenith light, and all but three have north light. The windows are double, the outside one is of plate glass and the inner, of polished pyramid glass. They

are equipped with motor driven light-proof shades with switch

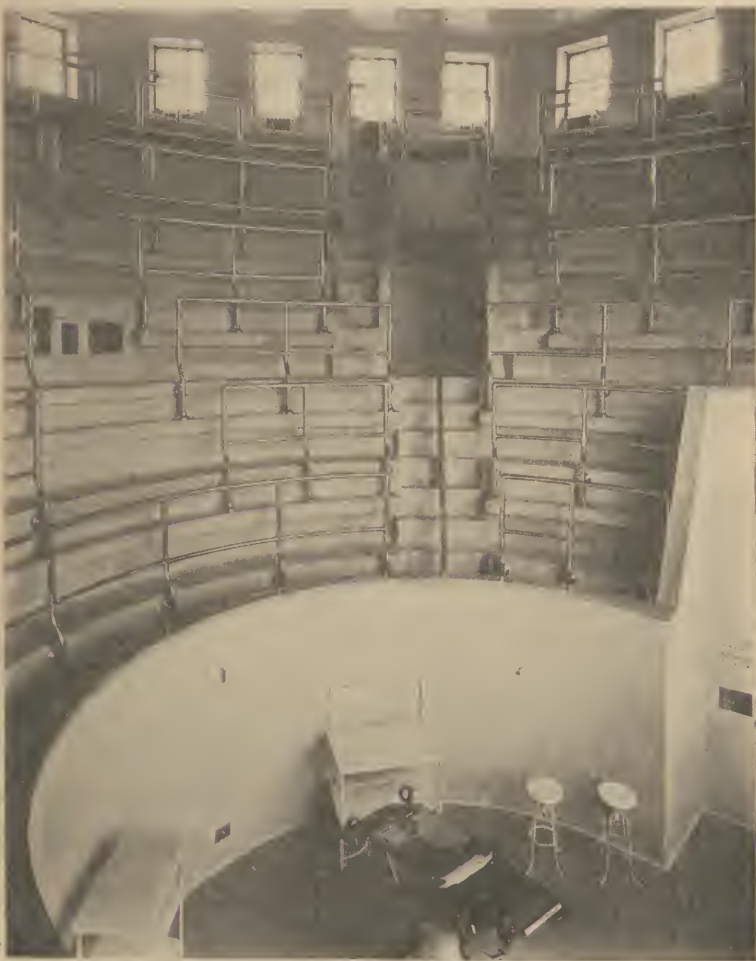


Fig. 4.—Amphitheater.

control in the arena. Small casement windows give access to an area 2 feet wide between the sashes, where the heating coils are

located, and to the cleaning balconies outside. Each room has silent signal connection with the bulletin board in the visiting doctors' waiting room and with the corridors of the sixth floor, to indicate the operation in progress (Fig. 3).

The amphitheater occupies the center of the north wing. It is lighted from the north by a glass area of 225 square feet. The gallery seats 300, the farthest seat being 26 feet from the operating table; the visiting doctors' entrance is on the sixth floor. The amphitheater is equipped with a motion picture and stereopticon booth for clinic use. The sterilizing room is to the right and the instrument room to the left of the arena (Fig. 4).

## EQUIPMENT OF OPERATING ROOM

Balfour operating table

Sink, with pedal valves and aspirator connections

Stools

Low square blocks



Fig. 5.—Operating room.

Sterile table

Basin stand

Roentgen-ray plate

History rack

Irrigator

Circular lights

Electric cautery with hairpin point and cutting point

Basket for soiled linen

Pail for sponges

Glass shelf with alcohol, Harrington's solution, hand lotion,  
and finger files



Fig. 6.—A sterilizing room. Equipment: autoclave, two sterile water tanks, two small boilers, large boiler, gas plate, table, instrument case, and hopper.

Towel racks

Drum for gowns

Drum for instruments, towels, and sleeves for cautery (these drums are especially made by the Scanlan-Morris Company of Chicago).

## PROCEDURES PRELIMINARY TO OPERATION

The surgeons begin their work at 8:30 a.m. and continue until the schedule of operations for the day is completed. Emergencies, of course, have the right of way at all hours. The schedule for the day is sent to the hospital the preceding afternoon so that preparations can be made accurately in respect to the kind and amount of material required.

In the evening the autoclave and boilers are prepared for the next day's work. In the large boiler are placed:

- Pan and tray used on sterile table to receive instruments

- Two basins to hold square packs

- Four or more packages of square packs

- One long pack or more.

In the small boiler are placed:

- Basin for holding instruments

- Safety pins and Jones clips

- Pan containing lifting forceps.

Water is run into the boilers the following morning.

Basins are wrapped separately in cloth (remnants of worn out sheets and gowns will do for this purpose) and sterilized in the autoclave for one hour. When basins are taken out, surgeons' gowns for five cases are put in the drum and sterilized for one hour. The drum is then removed to the operating room, and the gowns are taken out next morning as needed.

After the drum is removed the following are placed in the autoclave:

- Laparotomy sets

- Breast sets

- Goiter sets

- Dressings

- Sponges

- Towels

Large and small specimen pans  
Alcohol bowls  
Iodin bowls  
Square pan containing gauze for iodin and cotton for  
pledgets  
Covers for screen  
Sleeves for cautery  
Large curtain for operating table  
Small sheet for table  
Covers for faucet.

These are sterilized for one hour and unpacked the next morning as required.

Extra laparotomy sets, breast sets, goiter sets, towels, dressings, and specimen pans are kept sterilized. If not used within a certain time, they are resterilized.

### Gloves

Gloves are all tested, and if necessary, mended. They are then boiled right side out for fifteen minutes, hung up to dry, turned, powdered on the wrong side, and turned right side out. Next they are sorted as first, second, third, and fourth class; the first class, for surgeons, are unmarked; the cuffs of the second class are turned back two folds to mark them for the first assistant; the cuffs of the third are turned back one fold to mark them for the second assistant; the remainder are marked for the nurses by inserting the cuff of one glove in the cuff of another. Gloves are put together in packages of six pairs and are boiled fifteen minutes as needed.

### Setting up a room

At 6:30 a.m. a large boiler is filled with water, and steam turned on, so that square packs may boil for one hour, or autoclaved, which may be a better plan. In the small boiler are placed 3 gallons of water, and 3 ounces of Wyandotte soda, for sterilizing instruments.

At 7 a.m. the pan containing the lifting forceps is taken from

the small boiler and placed on the table in the sterilizing room. With these forceps towels are taken from the drum and the table covered. On the table are placed pins, clips, and basins, which have been sterilized in the instrument boiler.

In the boiler are placed

Straight forceps

Short and long curved forceps

Backhaus clips

Retractors

Long tissue forceps

Fibroid hooks

Tenacula, and a pan containing

Scissors

Pointed forceps

Stomach clippers

Needle holders

Appendix invertors

Tissue forceps

Discarded forceps, marked, to be used in handling gauze for painting with iodine

Pair of gloves for the sterile nurse.

All are to be boiled fifteen minutes.

All cutting instruments, knives excepted, are boiled ten minutes; other instruments may boil from twenty to thirty minutes.

As many knives as the day's work will require are placed in carbolic acid solution for at least one-half hour, then placed in a 75 per cent alcohol solution, or they may be placed in a sterile pan lined with sterile gauze or cotton to protect the edges of the knives, and boiled three minutes, brought to the table and placed in the 75 per cent alcohol solution.

### Basin stand

On the upper shelf of basin stand are placed

Basin with water for gloves

Basin with 1 : 5,000 bichlorid for washing hands during operation

Square dish containing sponges, cotton pledgets, and  
forceps for handling iodinated gauze

Alcohol

Iodin.

On the lower shelf of basin stand are placed

Ether

Scissors

Razor



Fig. 7.—Operating table in readiness for patient.

Bottle of alcohol

Bottle of iodine

Adhesive

Safety pins

Sponges for benzine.

On supply table are placed

Emesis towels

Hand towels

Pillow slips  
Anesthetists' gauze  
Table covers  
Jackets  
Leggings  
Sheets.



Fig. 8.—Prepared sterile table.

### **Sterile table (Fig. 8)**

The sterile table is draped with a sterile sheet and towels. A large curtain is attached to the rod of the sterile table with sterile safety pins; a pin is placed in the center and one at each

end of the upper part of the rod; Jones clips are placed on lower part of rod, one in the center, and one at each end.

The non-sterile nurse brings from the large boiler the instrument pan and tray and two basins to receive the instruments and sterile packs; then gloves are boiled for fifteen minutes.

The sterile nurse drapes the basin stand with sterile towels and places on it the pan containing sponges, cotton pledgets, forceps for handling iodinated gauze, bowl for alcohol, and bowl for iodine.

With lifting forceps the non-sterile nurse brings the instruments from the smaller boiler and places them in a tray on the sterile table; the sterile nurse arranges and covers them with a sterile towel.

The non-sterile nurse places in the small boiler

Extra instruments

Tubing for drains

Safety pins

Needles

Syringes

Jones clips

and then places on the basin stand a sterile basin containing plain water, and another containing 1 : 5,000 bichlorid solution.

In cups on table are placed

Catgut taken from 5 per cent carbolic solution

Silkworm taken from 4 per cent iodine solution

Silk taken from 70 per cent alcohol solution.

Knives are taken from the carbolic solution and placed in 70 per cent alcohol in a sterile pan until needed.

The two outer wrappers are removed from the drape, which is boiled two minutes.

Extra instruments and drape are placed in drum.

### Scrubbing hands

Hands and arms are scrubbed with soap and water for at least ten minutes. Surgeon's Jumbo, ivory, or green soap is used with taps of running cold and hot sterile water. An ample quantity of soap, worked into a lather, is rubbed into hands and

arms, nails are cleaned with a file, hands and arms are rinsed, resoaped, and the palms of the hands and around finger nails are scrubbed with brush or gauze; they are then rinsed thoroughly in water as hot as can be borne, carefully removing every trace of soap. Hands and arms are rinsed in 70 per cent alcohol, and the tips of the fingers dipped in 5 per cent iodine, or Harrington's solution.

### Operating room schedule

At 7:45 a.m. the first surgical assistant and the anesthetist come to the operating room.

The first assistant scrubs for ten minutes.

The anesthetist prepares ether, masks, cotton, and any other supplies she may need.

The orderly telephones for patient and the nurse brings him to the waiting room.

At 8:15 the surgeon arrives, and the second assistant informs the operating room staff.

The first assistant brings the patient from the waiting room and introduces him to the anesthetist and nurses.

The patient is assisted to the table; the anesthetist takes his bathrobe and slippers, and places them on the cart in the hall.

The non-sterile nurse cleanses the operative field with 1 : 1000 iodinated benzoin, and then with ether. Soap and water are used for hemorrhoid and fistula cases; for vaginal cases iodine is applied after the vagina has been cleansed with alcohol.

The first assistant applies to the operative field two coats of iodine. The first coat is allowed to dry before the second is applied. (See page 35.)

The assistant puts on sterile gown and applies a third coat of iodine to the operative field.

The sterile nurse puts on sterile gown and gloves.

The sterile nurse and first assistant drape the patient (p. 35).

When the surgeon is ready to operate, the second nurse switches signal light on bulletin boards, and the clinic files into the gallery.

The second assistant reads the history of the case.

## DURING THE OPERATION

### Instructions to the sterile nurse:

Keep your attention fixed on the surgeon's work.

Anticipate his needs so that he will not have to ask for anything.

Place instruments in the position most convenient to his hand.

Have specimen pans ready.

Have sponges open when necessary.

Keep one piece of catgut on the table; when it is used, supply another if it will be needed.

When the surgeon lays down the needle, put it in the holder and have it ready for him if he needs it again.

Cleanse your gloves after handling anything that has been used in the operation, and after emptying the pan of soiled instruments.

Use forceps in handling articles.

Change sterile table after each operation.

Remember that *the conscientiousness of the nurse regarding asepsis is as important in saving the patient's life as is the skill of the surgeon.*

### Instructions to the non-sterile nurse:

Be accurate in whatever you do. Safety first; gain speed by repetition.

Be alert to render assistance to the sterile nurse.

Resterilize every instrument every time it is used. Cleanse them, boil them for ten minutes, and return them to the table.

Wash and boil every instrument inadvertently dropped.

Keep perspiration wiped from the brow of the surgeon and assistants.

Wash soiled square packs after each operation.

Attend to boiler and keep it from boiling over.

Keep everything picked up.

Count the square packs after an operation; in laparotomies this must be done.

Avoid unnecessary hurry; do not give observers the impression that you are trying to attract attention.

Be as quiet as possible; the rule of silence applies to your movements as well as to your voice.

*Use forceps in handling anything that has been sterilized. When you carry a sterilized article, hold it a safe distance from you. Do not set it down, but wait for the sterile nurse to take it from you.*

When a surgeon has finished his work at the operating table, unfasten his gown and press the button for the stenographer.

When the assistants have finished their work, unfasten their gowns.

Replenish the iodine and alcohol bowls.

Replenish the supply of adhesive.

Mend the gloves if any have been punctured, sort them, pair them, and put them in to boil.

## AFTER THE OPERATION

When the surgeon has finished his work, the clinic files out. The surgeon has two second assistants who alternate at the operating table.

The orderly brings in the carriage for the patient and places it beside the operating table. To lift the patient, the anesthetist supports his head; the two second assistants take position opposite each other, one beside the carriage, the other beside the operating table, put their arms under the patient's shoulders and buttocks, grasp each other's hands, and move him easily and gently on to the carriage.

One assistant accompanies the orderly taking the patient to his room, examines whether the patient's bed has been properly warmed, sees that the patient is all right, puts him in charge of a nurse, and writes the orders for him. Meantime the other assistant and the anesthetist dress the table, prepare towels, jacket, sheet, and blanket for the next patient, and have his history at hand. The routine proceeds for the next case.

## PREPARATION OF PATIENT FOR ABDOMINAL OPERATION

A body jacket is put on the patient over the nightgown or nightshirt. A towel is placed over the pubic region and the nightgown or nightshirt tucked under the jacket. A strap is fastened over the thighs. The patient's wrists are strapped



Fig. 9.—In readiness for a laparotomy.

at his sides, pillows are placed under his elbows, and his feet and ankles are covered with a blanket; this is covered with a sheet, and the instrument tray is placed just distal to the operative field (Fig. 9).

The Trendelenburg position is used in operations on the uterus and adnexa, bladder and ureters, sigmoid and cecum. The patient is placed and draped as for other abdominal operations, except that the ankles are strapped at the foot of the table. No strap is used over the thighs, and the instrument tray is fastened in the special holder for the Trendelenburg position.

### GENERAL DIRECTIONS

The skin is cleaned with benzin and ether and one coat of 4 per cent tincture of iodine applied. Four sterile towels are placed around the site of the incision, one above, one below, and one on either side, and a laparotomy sheet with an opening to work through, is placed over the patient. A small sheet is placed above the operative field, passing over the screen and attached to it with two Jones clamps. Another coat of iodine is applied and the towels and laparotomy sheet are held in place by four Backhaus clamps, one clamp being placed at each corner of the exposed area of skin, the teeth of the clamps passing through the towels, the laparotomy sheet, and skin.

The incision is carried down through the muscle and the surgeon ties off the bleeding points. While he is doing this the second assistant washes the knife in sterile water. The surgeon rinses his gloves in sterile water and the two assistants put on the wound towels, using three Backhaus clamps on each side. The incision is carried through the peritoneum, and a salt sponge is placed on each side of the incision. The operative field is packed off with salt sponges. In performing hysterectomy, or resection of the sigmoid, a long pack is used to pack off the intestines. Throughout the operation every effort is made to prevent soiling. The bowel and stomach are cut across between clamps, and when the stomach or intestines are opened, if possible, rubber guarded clamps are applied to prevent the escape of contents. If the sponges become soiled, they are removed and clean ones substituted.

When the operation is completed the salt sponges and wound towels are removed and four clamps are placed on the edges of the peritoneum, one at the lower angle, one at the upper angle,

and one at the middle of each side. A sponge is placed over the omentum and intestines just under the incision. A double strand of No. 1 chromic catgut on a catgut needle is used in closing. First the peritoneum and fascia posterior to the muscle are approximated by one row of continuous sutures; the same suture is continued, approximating the fascia anterior to the muscle. Silkworm tension sutures are inserted, and tied, and the skin edges approximated with dermal sutures. The dressing is held in place by adhesive plaster.

### ORDINARY INSTRUMENTS

- Fifteen straight forceps (Ochsner) (Fig. 33)
- Five curved forceps (Carmalt) (Fig. 34)
- One tissue forceps (Kelly) (Fig. 35)
- Two dissecting scissors (Mayo) (Fig. 36)
- Two heavy scissors (Ferguson) (Fig. 37)
- One tissue forceps (Kelly) (Fig. 49)
- One scalpel
- Six Backhaus forceps (Fig. 38)
- Two wound towels
- Square packs (Fig. 27)
- Abdominal retractor (Fritsch) (Fig. 39)
- Ordinary abdominal sutures are:
  - No. 1 chromic double catgut thread on large Mayo needles (Fig. 40), with Hegar needle-holder (Fig. 41)
  - Five or six silkworm sutures on Mayo trocar needle (Fig. 42), with needle-holder
  - Dermal sutures on Keith needles (Fig. 43)
- All abdominal operations require a gauze dressing; all drainage operations require a cotton dressing

### APPENDECTOMY

#### Instruments and sutures

- Ordinary instruments
- Invertor (Mayo) (Fig. 44)
- Pointed forceps (Kelly) (Fig. 45)

Small scissors for cutting off appendix (Fig. 46)  
 Abdominal retractor (Fritsch) (Fig. 39)  
 No. 1 plain catgut, for ligating where appendix is removed  
 from mesentery  
 Sixteen-inch silk suture on No. 7, straight calix-eyed intestinal  
 needle (Fig. 47)  
 Small specimen pan  
 Ordinary abdominal closure

### CHOLECYSTECTOMY

#### Instruments and sutures

Ordinary instruments  
 Abdominal retractor (Fritsch) (Fig. 39)  
 Four large curved forceps (Fenger) (Fig. 48)  
 Tissue forceps (Kelly) (Fig. 49)  
 One-third strand No. 1 plain catgut for ligating cystic duct  
 No. 0 plain double on small Mayo needle (Fig. 40) and Hegar  
 needle-holder (Fig. 41), for sewing where the gallbladder  
 is removed from the liver  
 More catgut and drains are used in more difficult cases  
 If the case is dry no drain is used  
 Ordinary abdominal closure  
 Put safety pin in each drain  
 Note: Drains are put up after specimen is removed

### CHOLECYSTOSTOMY

#### Instruments and sutures

Ordinary instruments  
 Gallbladder trocar (Ochsner) (Fig. 50)  
 Gallbladder scoop (Mayo) (Fig. 51)  
 Large bile spoon (Moore) (Fig. 52)  
 Gauze packer (Kelly) (Fig. 53)  
 Dressed tube (about 10 inches long and  $\frac{1}{8}$  inch in diameter)  
 covered with two thicknesses of 1-inch iodoform gauze  
 wrapped in gutta percha

One-half strand of No. 0 plain catgut in intestinal needle on needle-holder for sewing in tube

Bring dressing, connector, and bottle to table after ordinary abdominal closure

### CHOLEDOCHOTOMY

#### Instruments and sutures

Ordinary instruments

Common duct probes (Mayo) (Fig. 54)

Common duct scoop (Mayo) (Fig. 55)

Gallbladder scoop (Mayo) (Fig. 51)

Three stomach clippers (Ochsner) (Fig. 56)

Tissue forceps (Kelly) (Fig. 49)

Catheter or Robson drain (catheter sizes 8, 10, and 12)

No. 0 plain catgut for sewing in the catheter (one-third strand on curved intestinal needle with holder) (Murphy) (Fig. 41)

Ordinary abdominal closure

### RECONSTRUCTION OF DUCTS

#### Instruments and sutures

Ordinary instruments

Four stomach clippers (Ochsner) (Fig. 56)

Catheters, sizes 8, 10, and 12

Common duct probe (Mayo) (Fig. 54)

Tissue forceps (Kelly) (Fig. 49)

T-tube

No. 1 plain catgut for tying

First suture: Silk on curved intestinal needle with holder (Murphy) (Fig. 41)

Second suture: No. 0 chromic catgut on intestinal needle with holder (Murphy) (Fig. 41)

Third suture: Silk on curved intestinal needle with holder (Murphy) (Fig. 41)

Put up change

Ordinary abdominal closure

## CHOLECYSTOGASTROSTOMY

### Instruments and sutures

Ordinary instruments

Gallbladder trocar (Ochsner) (Fig. 50)

Large bile spoon (Moore) (Fig. 52)

Four stomach clippers (Ochsner) (Fig. 56)

Two straight rubber clamps (Scudder) (Fig. 57)

First suture: 18 inches of silk on straight intestinal needle (Fig. 47). (Wrap remaining silk in square pack, Fig. 27.)

Small knife. Straight Mayo dissecting scissors (Fig. 58)

Second suture: No. 0 chromic catgut on straight intestinal needle (Fig. 47). Put up change of ordinary instruments.

Use silk which remained after suturing gallbladder and stomach for further suturing

Ordinary abdominal closure

## OPERATION FOR PANCREATIC CYST

### Instruments and sutures

Ordinary instruments

Abdominal retractor (Fritsch) (Fig. 39)

Tubing with suction bottle (Fig. 59)

Great quantity of square packs (Fig. 27)

Large tube stitched into cyst sac with No. 1 plain catgut on catgut needle

No. 1 or 2 catgut for ligating vessels

Connector for tube

Ordinary abdominal closure

## SPLENECTOMY

### Instruments and sutures

Large curved forceps (Fenger) (Fig. 48)

Abdominal retractor (Fritsch) (Fig. 39)

Two long packs (Fig. 28), only one usually required

No. 1 plain catgut for ligating (Fig. 40)

One single strand plain catgut on Mayo needle (Figs. 40 and 41)

Ordinary abdominal closure

### GASTRO-ENTEROSTOMY

#### Instruments and sutures

Ordinary instruments

Four stomach clippers (Ochsner) (Fig. 56)

Pointed forceps (Kelly) (Fig. 45)

Two straight rubber-covered clamps (Scudder) (Fig. 57)

Two small wet sponges opened and rolled together. Six or seven square packs (Fig. 27)

No. 0 chromic catgut on straight needle for first row

Wrap catgut which remains after the first row in a square pack (Fig. 27)

Put up small knife, blunt straight Mayo scissors (Fig. 58)

No. 0 chromic catgut on straight needle for second row

No. 0 plain catgut for ligating

Put up change with two square packs (Fig. 27)

Change consists of the following:

Six straight forceps (Ochsner) (Fig. 33)

Two curved forceps (Carmalt) (Fig. 34)

Two pairs scissors: one Ferguson (Fig. 37) and one Mayo dissecting (Fig. 36)

Pointed forceps (Kelly) (Fig. 45)

Sponges (Fig. 26)

Use catgut wrapped in square pack (Fig. 27) after change

Ordinary abdominal closure

### EXCISION OF DUODENAL ULCER

#### Instruments and sutures

Ordinary instruments

Four or six stomach clippers (Ochsner) (Fig. 56)

Small knife

Pointed forceps (Kelly) (Fig. 45)

First suture: No. 0 chromic catgut on straight needle

No. 0 plain catgut for ligating

Square packs for cleansing operative field (Fig. 27)

Second suture: 18 inches of silk on straight intestinal needle (Fig. 47)

Put up change, consisting of ordinary instruments

Ordinary abdominal closure

Note: Have cautery and No. 0 chromic catgut on curved needle with holder ready in case a second ulcer is found after first ulcer has been excised

### EXCISION OF GASTRIC ULCER

#### Instruments and sutures

Ordinary instruments

Six stomach clippers (Ochsner) (Fig. 56)

Pointed forceps (Kelly) (Fig. 45)

Small knife

Cautery, if desired (Balfour method)

First suture: No. 0 chromic catgut on straight needle

Second suture: 18 inches of silk on small curved intestinal needle

Put up change as for gastro-enterostomy

Gastro-enterostomy

Ordinary abdominal closure

### EXCISION OF GASTROJEJUNAL ULCER

#### Instruments and sutures

Ordinary instruments

Four stomach clippers (Ochsner) (Fig. 56)

Pointed forceps (Kelly) (Fig. 45)

Two straight rubber-covered clamps (Scudder) (Fig. 57)

Opening in stomach closed first with No. 0 chromic catgut on a straight needle, second with silk on a straight needle (Fig. 47)

Opening in jejunum closed in similar manner

One-half strand No. 1 plain catgut on catgut needle (Figs. 40 and 41) for closing mesentery

New gastro-enterostomy or excision of duodenal ulcer sometimes necessary (see gastro-enterostomy or technic for duodenal ulcer)

Put up change, consisting of instruments and sutures for ordinary abdominal closure

### GASTROSTOMY

#### Instruments and sutures

Ordinary instruments

Four stomach clippers (Ochsner) (Fig. 56)

Small knife

Have ready rubber-covered clamp (Scudder) (Fig. 57)

Pezzar catheter (retention catheter)

Silk on curved intestinal needle for holding catheter in place

Ordinary abdominal closure

### RESECTION OF STOMACH: POLYA OPERATION

#### Instruments and sutures

Ordinary instruments

Tissue forceps (Kelly) (Fig. 49)

Two Payr clamps (small and medium) (Fig. 66)

Two straight rubber-covered clamps (Scudder) (Fig. 57)

No. 1 plain catgut for ligating

Electric cautery (Fig. 144), used after clamps are applied to stomach and stomach cut off

One-third strand of chromic catgut No. 1 on catgut needle used for closing duodenum when through ligating (Figs. 40 and 41)

Catgut used first and then gone over with about 15 inches of silk on small curved intestinal needle (Murphy)

Two straight clamps (Scudder) (Fig. 57)

Four clippers (Ochsner) (Fig. 56)

One pointed forceps (Kelly) (Fig. 45)

Eighteen inches of silk on curved intestinal needle (Murphy) with holder (Fig. 41) used to suture stomach to intestine; wrap remaining silk in square pack (Fig. 27)

Put up small blunt dissecting scissors (Fig. 58)  
 Small knife  
 No. 0 chromic catgut on straight needle  
 Put up change, using silk which was wrapped in square pack  
 (Fig. 27)  
 Add straight needle (Fig. 47) and clean needle-holder (Fig. 41)  
 Sometimes more silk is required  
 Put up clean tissue forceps (Fig. 49)  
 Ordinary abdominal closure

## SLEEVE RESECTION

### Instruments and sutures

Ordinary instruments  
 Four stomach clippers (Ochsner) (Fig. 56)  
 Tissue forceps (Kelly) (Fig. 49)  
 Two Payr clamps (medium) (Fig. 66)  
 Two straight rubber-covered clamps (Scudder) (Fig. 57)  
 Cautery used to cut off stomach after clamps are applied  
 (Fig. 144)  
 No. 1 catgut for ligating  
 Eighteen inches of silk on curved intestinal needle (Murphy)  
 with holder to suture the two ends of stomach together,  
 wrapping the remaining silk in a square pack (Fig. 27)  
 No. 0 chromic catgut on straight needle  
 Put up change and clean square packs, using silk which was  
 wrapped in square pack, have straight needle, needle-  
 holder and tissue forceps in change  
 Ordinary abdominal closure

## BILLROTH NO. 2

### Instruments and sutures

Ordinary instruments  
 No. 1 catgut for ligating  
 Tissue forceps (Kelly) (Fig. 49)  
 Two Payr clamps (small and medium) (Fig. 66)  
 One straight rubber-covered clamp (Scudder) (Fig. 57)

Electric cautery for cutting off stomach (Fig. 144)

No. 1 chromic catgut on catgut needle with holder for closing duodenum, then covered with a row of silk on curved intestinal needle (Murphy)

No. 0 chromic catgut on straight needle for closing opening in stomach, then covered with silk on straight needle

Gastro-enterectomy is made using gastro-enterostomy technic

## RESECTION OF CECUM, ILEUM, AND TRANSVERSE COLON

### Instruments and sutures

Ordinary instruments

Abdominal retractors (Fritsch) (Fig. 39)

No. 1 catgut for ligating

Two straight rubber-covered clamps (Scudder) (Fig. 57)

Four stomach clippers (Ochsner) (Fig. 56)

Electric cautery (Fig. 144)

Put up one-half strand No. 1 plain catgut on catgut needle (Figs. 40 and 41) for suturing the mesentery after specimen has been removed

Anastomosis first made with silk on a straight intestinal needle, and second with No. 0 chromic catgut on straight intestinal needle (Fig. 47)

Put up ordinary change

Enterostomy

One straight rubber-covered clamp (Fig. 57)

Two stomach clippers (Fig. 56)

Small knife

Put up catheter (6, English) and silk on a curved needle (Murphy) with needle-holder (Fig. 41)

Ordinary abdominal closure

## BROWN'S OPERATION FOR COLITIS

### Instruments and sutures

Ordinary instruments

Abdominal retractors (Fritsch) (Fig. 39)

Four stomach clippers (Fig. 56)  
 Straight rubber-covered clamps (Fig. 57)  
 Electric cautery (Fig. 144)  
 Gauze packer (Kelly) (Fig. 53)  
 Smithies tube (about 12 inches) containing a cotton pledget  
 in one end  
 Two one-half strands No. 1 chromic catgut on catgut needle  
 (Figs. 40 and 41)  
 Vaseline dressing  
 Ordinary abdominal closure

### ILEOCOLOSTOMY

#### Instruments and sutures

Ordinary instruments  
 Abdominal retractors (Fritsch) (Fig. 39)  
 Two straight rubber-covered clamps (Fig. 57)  
 Four stomach clippers (Ochsner) (Fig. 56)  
 Small knife  
 Straight Mayo dissecting scissors (Fig. 58)  
 No. 1 plain catgut for ligating  
 Anastomosis made with silk on straight needle (Fig. 47)  
 Chromic catgut No. 0 on straight needle  
 Put up change  
 Ordinary abdominal closure

### EXTRAPERITONEAL SHORTENING OF THE ROUND LIGAMENTS

#### Instruments and sutures

Ordinary instruments  
 Two-prong retractors (Collins) (Fig. 71)  
 No. 1 plain catgut for ligating  
 One-half strand No. 2 chromic catgut (Figs. 40 and 41) for  
 ligaments  
 One-half strand No. 1 plain catgut (Figs. 40 and 41)  
 Dermal sutures on Keith needle (Fig. 43)

## INGUINAL HERNIA

**Instruments and sutures**

Ordinary instruments

Two-prong retractors (Collins) (Fig. 71)

Large four-prong retractors for large hernia (Israel) (Fig. 70)

One-third strand No. 1 plain catgut on catgut needle for ligating sac

Put up large curved silkworm suture needle (Bonney) (Fig. 80) for "kocherizing" sac

One-half strand No. 1 chromic catgut on catgut needle for closing hernia (Figs. 40 and 41)

No. 1 plain catgut for ligating

No. 1 plain catgut on catgut needle (Figs. 40 and 41)

Dermal suture on Keith needle (Fig. 43)

## FEMORAL HERNIA

**Instruments and sutures**

Ordinary instruments

Two-prong retractors (Collins) (Fig. 71)

No. 1 chromic catgut on catgut needle (Figs. 40 and 41)

No. 1 plain catgut on catgut needle (Figs. 40 and 41)

No. 1 plain catgut for ligating

Dermal suture on Keith needle (Fig. 43)

## VENTRAL HERNIA

**Instruments and sutures**

Ordinary instruments

Sharp retractors (Murphy) (Fig. 81)

Four-prong retractor (Israel) (Fig. 80)

No. 1 chromic double catgut on catgut needle (Figs. 40 and 41)

Five silkworm sutures on Mayo trocar needle (Fig. 42)

Dermal suture on Keith needle (Fig. 43)

## UMBILICAL HERNIA

### Instruments and sutures

Same as for ventral hernia

## OPERATION FOR SCROTAL HERNIA

### Instruments and sutures

Same as for inguinal hernia

## OPERATION FOR HYDROCELE

### Instruments and sutures

Ordinary instruments

Two-prong retractors (Collins) (Fig. 71)

Gallbladder trocar (Fig. 50)

Small basin for fluid

No. 1 plain catgut for ligating

No. 1 plain catgut on catgut needle (Figs. 40 and 41)

Dermal suture on Keith needle (Fig. 43)

If castration is done in either hydrocele or inguinal hernia,  
more catgut is used on needle and for ligating

## OPERATION FOR SPERMATOCELE AND VARICOCELE

### Instruments and sutures

Same as for hydrocele except for trocar

## OPERATION FOR DRAINAGE OF ABSCESS

### Instruments and sutures

Small sharp knife

Tissue forceps (Fig. 35)

Bone curets (large and small) (Fig. 98)

Small pointed forceps (Kelly) (Fig. 45)

Catgut for ligating

Iodoform gauze for packing



Fig. 10.—Trendelenburg position.

## ABDOMINAL HYSTERECTOMY

### Instruments and sutures

Ordinary instruments

Balfour abdominal retractor (Fig. 60)

Long pack (Fig. 28)

Tissue forceps (Kelly) (Fig. 49)

Two tenaculums or Henrotin vulsellum forceps (Fig. 61)

Fibroid hooks (Fig. 62)

The remaining portion of cervix is swabbed with iodin after specimen is removed in a subtotal hysterectomy

In a total hysterectomy, 8 inches of iodoform gauze on a Murphy forceps is dipped in iodin and inserted into the vagina

One-third strand No. 2 plain catgut on small cervix needle with Hegar needle-holder (Figs. 40 and 41)

After the surgeon has used the catgut on needle, put the needle, needle-holder, and tissue forceps in pan and remove from the table

Two-thirds strand of No. 1 catgut for ligating

Place on table: Tissue forceps (Fig. 35), No. 2 plain double catgut on catgut needle with Hegar needle-holder (Figs. 40 and 41). Bring clean square pack after long pack and retractor are removed. Bring up change consisting of:

Wound towels

Straight forceps (Fig. 33)

Curved forceps (Fig. 34)

Tissue forceps (Fig. 35)

Cutting scissors (Fig. 37)

Sponges (Fig. 26)

Ordinary abdominal closure

## MYOMECTOMY

### Instruments and sutures

Ordinary instruments

Balfour retractor (Fig. 60) and long pack (Fig. 28)

Tissue forceps (Kelly) (Fig. 49)

No. 1 plain catgut for ligating

First suture: One-half strand No. 1 plain catgut on catgut needle (Figs. 40 and 41)

Second suture: One-half strand No. 1 chromic catgut on catgut needle (Figs. 40 and 41)

More catgut may be required

Ordinary abdominal closure

## OÖPHORECTOMY AND SALPINGECTOMY

### Instruments and sutures

Ordinary instruments

Balfour retractor (Fig. 60)

Tissue forceps (Fig. 49)

Long pack (Fig. 28)

No. 1 catgut for ligating

One-half strand No. 1 catgut on catgut needle for sewing  
after removal of tube or ovary (Figs. 40 and 41)

Ordinary abdominal closure

## HYSTEROTOMY

### Instruments and sutures

Ordinary instruments

Balfour retractors (Fig. 60)

Long pack (Fig. 28)

Tissue forceps (Kelly) (Fig. 49)

Sims uterine curet, sharp (Fig. 64)

No. 1 plain catgut for ligating

First suture: One-half strand No. 1 plain catgut on catgut  
needle (Mayo) (Figs. 40 and 41)

Second suture: One-half strand No. 1 or 2 chromic catgut  
on catgut needle (Mayo) (Figs. 40 and 41)

Ordinary abdominal closure

## INTRAPERITONEAL SHORTENING OF ROUND LIGAMENTS

### Instruments and sutures

Ordinary instruments

Balfour retractors (Fig. 60) and long pack (Fig. 28), seldom  
used

Two stomach clippers (Ochsner) (Fig. 56) for catching liga-  
ments

One-half strand No. 1 chromic catgut on catgut needle  
(Figs. 40 and 41)

Ordinary abdominal closure

## CESAREAN SECTION

### Instruments and sutures

Ordinary instruments

Balfour retractors (Fig. 60)

Long pack (Fig. 28)

No. 1 chromic double in small catgut needle with holder  
(2 strands)

Ordinary abdominal closure

Have ready for infant:

Sterile towel

Large basin containing sterile hot water

Large basin containing sterile cold water

Catheters, sizes 12 and 14 (French)

Tape for ligating cord

Scissors

Two forceps

Small sponges

Sterile receiver

## RESECTION OF SIGMOID

### Instruments and sutures

Ordinary instruments

No. 1 catgut for ligating

Two tissue forceps (Fig. 49)

Balfour retractors (Fig. 60)

Long pack (Fig. 28)

Four large Carmalt curved forceps (Fig. 100)

Two Brunner step forceps or right-angle clamp (Fig. 84)

Four stomach clippers (Ochsner) (Fig. 56)

Electric cautery for cutting off bowel (Fig. 144)

One-half strand No. 1 plain catgut on a curved catgut needle  
with holder

One-half strand No. 1 chromic catgut in curved catgut needle  
with holder

Covered with silk in curved intestinal needle (Murphy) with  
holder

Three Penrose drains

Ordinary abdominal closure

## TUBE RESECTION

## Instruments and sutures

Ordinary instruments

Balfour retractors (Fig. 60) and long pack (Fig. 28)

Tissue forceps (Kelly) (Fig. 49)

No. 1 catgut for ligating

Four stomach clippers (Ochsner) (Fig. 56)

Two straight rubber-covered clamps (Scudder) (Fig. 57)  
or Brunner step forceps (Fig. 84) or right-angle clamp

Electric cautery (Fig. 144)

Put up one-half strand No. 1 plain catgut on catgut needle  
(Figs. 40 and 41) for suturing opening made in mesentery  
after specimen has been removed

Put up tube (Smithies)

Eighteen inches of silk on curved intestinal needle (Murphy)  
with holder (Fig. 41). Remaining silk wrapped in square  
pack (Fig. 27)

No. 0 chromic catgut on curved needle (Fig. 40) with holder  
(Fig. 41)

Put up change

Remaining silk then used; more silk sometimes required

Ordinary abdominal closure

One silkworm suture for sewing tube in rectum

## CLOSURE OF COLOSTOMY

## Instruments and sutures

Ordinary instruments

Sharp retractors (Murphy) (Fig. 81)

Tissue forceps (Kelly) (Fig. 49)

Four stomach clippers (Fig. 56)

No. 0 chromic catgut on straight needle

No. 1 chromic catgut single in catgut needle with holder

Four silkworm gut sutures

Dermal on Keith needle

## MIKULICZ OPERATION

### Instruments and sutures

Ordinary instruments  
 Balfour retractors (Fig. 60)  
 Long pack (Fig. 28)  
 Tissue forceps (Kelly) (Fig. 49)  
 No. 1 catgut for ligating  
 Two one-half strands No. 1 plain catgut on catgut needle  
 (Figs. 40 and 41)  
 Six silkworms on Mayo trocar needle (Fig. 42)  
 Dermal sutures on Keith needle (Fig. 43)  
 Dressing with quantity of vaselin  
 Piece of gutta percha for covering bowel

## URETEROLITHOTOMY

### Instruments and sutures

Ordinary instruments  
 Balfour retractors (Fig. 60)  
 Deaver retractors (Fig. 73)  
 Stomach clippers (Ochsner) (Fig. 56)  
 About 6 inches of tape to hold ureter  
 Long knife (Mayo) (Fig. 101)  
 Gallbladder scoop (Fig. 51)  
 Stone forceps (Mayo) (Fig. 72)  
 One-half strand No. 00 plain catgut on intestinal needle  
 (Murphy) with needle-holder (Fig. 72)  
 Rubber tissue or two or three one-half rubber tubes for drains  
 Ordinary abdominal closure

## URETERECTOMY

### Instruments and sutures

Ordinary instruments  
 Knife  
 Two-prong retractors (Collins) (Fig. 71)

- No. 1 catgut for ligating
- No. 1 catgut on catgut needle (Figs. 40 and 41)
- Dermal suture on Keith needle (Fig. 43)

### TRANSPLANTATION OF URETER

#### Instruments and sutures

- Ordinary instruments
- Balfour retractors (Fig. 60)
- Two tissue forceps (Kelly) (Fig. 49)
- Four stomach clippers (Ochsner) (Fig. 56)
- About 6 inches of tape for ureter
- Curved rubber-covered clamp
- Deaver retractors (Fig. 73)
- Small knife
- First suture: No. 0 chromic catgut on needle (Murphy), holder (Hegar) (Fig. 41), for putting ureter into bowel
- Second suture: Silk on curved intestinal needle (Murphy) with needle-holder (Fig. 41)
- Ordinary abdominal closure

### DILATATION OF URETHRA

(Retrograde)

#### Instruments and sutures

- Ordinary instruments
- Sounds (sizes 10, 12, 14, and 16, English) (Van Buren) (Figs. 88 and 89)
- Bladder retractors (Judd-Masson) (Fig. 74)
- Blunt retractors (Green) (Fig. 75)
- Tissue forceps (Kelly) (Fig. 49)
- Deaver retractors (Fig. 73)
- Large catheter for bladder (size 20, English)
- No. 1 or 2 plain catgut on catgut needle with needle-holder for sewing tube in bladder (Figs. 40 and 41)
- Five or six silkworm sutures on Mayo trocar (Fig. 42)

## DIVERTICULUM OF BLADDER

### Instruments and sutures

Same as for resection of bladder

Catheter is left in urethra if bladder is closed tight

Catheters (sizes 8 and 10, English)

## RESECTION OF BLADDER

### Instruments and sutures

Ordinary instruments

Balfour retractors (Fig. 60)

Oviatt forceps (Fig. 76)

Deaver retractors (Fig. 78)

Two tissue forceps (Kelly) (Fig. 49)

Deep retractors (Pynchon) (Fig. 77)

Two blunt retractors (Green) (Fig. 75)

Bladder retractors (Judd-Masson) (Fig. 74)

Bladder retractors (Rankin) (Fig. 107)

Three curved forceps (Fenger) (Fig. 48)

Square packs (Fig. 27)

One-half strand No. 1 plain catgut on catgut needle (Figs 40 and 41)

One-half strand No. 2 plain catgut on catgut needle (Figs 40 and 41)

No. 1 catgut for ligating

Drains, split tube, large catheter (size 20) for bladder

Electric cautery (Fig. 144)

Ordinary abdominal closure

## PROSTATECTOMY

### Instruments and sutures

Ordinary instruments

Two tissue forceps (Kelly) (Fig. 49)

Deaver retractors (Fig. 73)

Bladder retractors (Judd-Masson) (Fig. 74)

Two blunt retractors (Green) (Fig. 75)

Bladder retractor (Rankin) (Fig. 107)  
Oviatt prostate forceps (Fig. 76)  
Large catheter (about size 20, English)  
One and one-half yards Kephlin gauze (3 inches wide)  
Put up one square pack (Fig. 27)  
One-half tube in space of Retzius  
One-half strand No. 1 plain catgut (Figs. 40 and 41) for suturing capsule  
One-half strand No. 1 plain catgut for sewing tube into bladder  
Five silkworm sutures (Mayo trocar) (Fig. 42)  
Put up wire spreader after removing bladder retractor  
Catheters (sizes 8 and 10) with some K Y for catheterizing patient before operation

### CYSTOTOMY

#### Instruments and sutures

Ordinary instruments  
Two blunt retractors (Green) (Fig. 75)  
Deaver retractors (Fig. 73)  
Bladder retractors (Judd-Masson) (Fig. 74)  
Bladder retractor (Rankin) (Fig. 107)  
Tissue forceps (Kelly) (Fig. 49)  
Stone forceps, curved and straight (Little lithotomy forceps) (Figs. 78 and 79)  
Trocar and cannula  
Large catheter (size 20, English)  
Square packs (Fig. 27)  
One-half strand No. 1 plain catgut (Figs. 40 and 41) for sewing tube in bladder  
Five silkworm sutures (Fig. 42)  
Catheters for catheterizing patient before operation, with a little K Y on sponge for lubricating catheters (sizes 8 and 10, English)

## PREPARATION OF PATIENT FOR KRASKE OPERATION

The patient lies on his abdomen, with the kidney rack, without the wings, under him at the suprapubic region. This rack is raised about one foot above the table. His ankles are strapped at the foot of the table and his arms are supported by a board passing under the pad on the table at the level of the shoulders. Feet and ankles are covered with a blanket; a sheet



Fig. 11.—Kraske position undraped.

is spread over the legs, and the instrument tray is placed about a foot distal to the operative field. The operative field is cleansed with benzin and ether, and the first coat of iodine applied. Four sterile towels are placed around the operative field, and a damp sterile towel distal to the anus. A laparotomy sheet is spread over the patient and the second coat of iodine applied to the operative field. Towels and laparotomy sheet are fixed in position

with Backhaus clips. The head of the table is lowered slightly before the operation is begun (Figs. 11 and 12).



Fig. 12.—Kraske position draped.

### KRASKE (POSTERIOR EXCISION)

#### Instruments and sutures

Ordinary instruments

Tissue forceps (Kelly) (Fig. 49)

Eight large curved forceps (Fenger) (Fig. 48)

Wide chisel (Alexander) (Fig. 67)

Bone mallet (Fig. 68)

Kraske 6-prong retractors (Fig. 69)

Electric cautery (Fig. 144)

No. 1 plain catgut for ligating

Catgut on needle (Figs. 40 and 41)

One-half strand No. 1 chromic catgut on needle (Figs. 40 and 41)

One-half strand No. 1 plain catgut on needle

Five silkworm sutures on Mayo trocar (Fig. 42)

Dermal sutures on Keith needle

Strip of iodoform gauze pack if there is considerable bleeding  
Split tube  
Dressing with quantity of vaselin

### POSTANAL DERMOID

#### Instruments and sutures

Same as for removal of coccyx

### REMOVAL OF COCCYX

#### Instruments and sutures

Ordinary instruments  
No. 1 plain catgut for ligating  
Two sharp retractors  
Chisel (Fig. 67)  
Mallet (Fig. 68)  
No. 1 catgut in catgut needle with holder  
Silkworm  
Dermal

## PREPARATION OF PATIENT FOR OPERATION ON THE KIDNEY

The patient lies on his side and is held in position by the wings of the kidney rack, for the posterolateral incision. If the left kidney is to be operated on, the rack is placed so that the handle is on the right side of the table. The patient is on his right side with the right kidney region in the space between the wings of the kidney rack. His arms are extended in front of



Fig. 13.—Kidney position undraped.

him and supported on a board passing under the pad on the table. His ankles are strapped to the foot of the table, the left ankle about twelve inches posterior to the right. A rubber pillow is placed between his knees and a strip of gauze is passed around the left knee and tied to the right side of the table. Feet and ankles are covered with a blanket. A sheet is placed

over the legs and the instrument tray placed a few inches distal to the operative field.

The skin is cleansed with benzin and ether; one coat of iodine is applied and four sterile towels are placed around the site of the incision. A laparotomy sheet is spread over the patient; the towels and edges of the opening in sheet are fixed in position by Backhaus clips. Before starting the operation the kidney



Fig. 14.—Kidney position draped.

rack is raised a few inches; it is let down again before the wound is closed (Figs. 13 and 14).

### PELVIC LITHOTOMY

#### Instruments and sutures

Ordinary instruments

Four-prong retractors (Israel) (Fig. 70)

Tissue forceps (Kelly) (Fig. 49)

Two stomach clippers (Ochsner) (Fig. 56)

Stone forceps (Mayo) (Fig. 72)

Large gallbladder scoop (Mayo) (Fig. 51)

Small knife

One-half strand No. 0 plain catgut on intestinal needle (Murphy) with needle-holder (Fig. 41)

Two or three one-half rubber tubes or Penrose tube

Ordinary abdominal closure

### NEPHRECTOMY FOR HYDRONEPHROSIS

#### Instruments and sutures

Ordinary instruments

Four-prong retractors (Israel) (Fig. 70)

Large curved forceps (Fenger) (Fig. 48)

Square packs (Fig. 27)

Electric cautery (Fig. 144)

Two-thirds strand No. 1 plain double catgut for ligating

Strip of iodoform gauze if forceps are left on pedicle and vessels

Ordinary closure

### NEPHRECTOMY FOR TUBERCULOUS KIDNEY

#### Instruments and sutures

Ordinary instruments

Four-prong retractors (Israel) (Fig. 70)

Tissue forceps (Kelly) (Fig. 49)

Three or four curved forceps (Fenger) (Fig. 48)

Square packs (Fig. 27)

Electric cautery (Fig. 144)

Two-thirds strand No. 1 plain double catgut for ligating

Put up one-half strand No. 1 plain catgut for ligating ureter

One-fourth inch rubber tube (8 inches long) through which a Murphy forceps (Fig. 63) is inserted and the catgut ligating the ureter is caught and brought through tube

Put up catgut needle and tube sutured to abdominal wound with catgut (Figs. 40 and 41)

Strip of iodoform gauze if forceps are left on pedicle and vessels

Ordinary abdominal closure

## LITHOTOMY POSITION

Leggings are put on the patient for operations on the vagina, perineum, vulva, and rectum. She lies on her back; after she is anesthetized, her hands are clasped across her chest and her feet are placed in stirrups about one and one-half feet above the operating table. She is placed toward the foot of the table so that buttocks are well over the edge.

If the operation is to correct urinary leakage, only alcohol is used to prepare the operative field. If the operation is on the anus or rectum, the anus is dilated and the anal canal and rectum are cleansed with soapy water. In other operations the skin and vagina are cleansed with alcohol and then with iodine; a wad of cotton soaked in iodine held on a clamp, is placed in the vagina.

A sterile towel is placed over the pubic region, and another towel over the anus, and held in position by two Backhaus clips in the perineum. The patient is covered with a perineal sheet, and the instrument tray is placed distal to the operative field.

## VAGINAL HYSTERECTOMY

### Instruments and sutures

Weighted vaginal speculum (Auvard) (Fig. 82)

Two tenaculums (Fig. 61)

Ferguson retractors (Fig. 83)

Sharp retractors (Murphy) (Fig. 81)

Four large curved forceps (Fenger) (Fig. 48)

Gallbladder roll

Ordinary instruments

Two strands No. 1 double chromic catgut on catgut needle  
(Figs. 40 and 41)

If clamps are left on, no catgut is used, but a long strip of iodoform gauze, and linen for tying forceps

If forceps are removed, perineorrhaphy is performed  
If clamps are left on, retention catheter is left in  
Sims uterine sound used to insert catheter; K Y for lubricating  
Vaginal pad and T-binder

### AMPUTATION OF CERVIX

#### Instruments and sutures

Heavy weight retractors (Auvard) (Fig. 82)  
Ordinary instruments  
Side retractors (Fig. 83)  
Tenaculums (Fig. 61)  
Two one-half strands No. 1 chromic catgut on small cervix  
needle  
Vaginal pad and T-binder

### CURETTAGE

#### Instruments and sutures

Heavy weight retractors (Auvard) (Fig. 82)  
Two tenaculums (Fig. 81)  
Dilator (Wylie) (Fig. 85)  
Two curets, dull and sharp (Sims) (Fig. 64) (Thomas)  
(Fig. 86)  
Douche point (Bozeman) (Fig. 87)  
Sterile water in irrigating can  
Sometimes Sims vaginal retractor is used (Fig. 99)  
Strip gauze soaked with iodine and gauze packer (Fig. 53)

### OPERATION FOR VESICOVAGINAL FISTULA

#### Instruments and sutures

Ordinary instruments  
Six stomach clippers (Ochsner) (Fig. 56)  
Heavy weight retractors (Auvard) (Fig. 82)  
Side retractors (Fig. 83)  
Uterine sound (Sims)

Retention catheter  
Glass syringe (1 ounce)  
Graduate with sterile water  
No. 1 plain catgut on catgut needle (Figs. 40 and 41)  
No. 1 chromic catgut on catgut needle (Figs. 40 and 41)

#### PERINEORRHAPHY

##### Instruments and sutures

Ordinary instruments  
Small, sharp, pointed scissors  
Six or eight stomach clippers (Ochsner) (Fig. 46)  
One-half strand No. 1 chromic catgut on catgut needle  
(Figs. 40 and 41)  
Put up graduate containing sterile water and sponge for  
running over sutures

#### BOVEE OPERATION

##### Instruments and sutures

Ordinary instruments  
Heavy weight retractors (Auvard) (Fig. 82)  
Side retractors (Fig. 83)  
Tenaculums (Fig. 61)  
Six or eight stomach clippers (Ochsner) (Fig. 56)  
Sharp pointed scissors (Fig. 46)  
One-half strand No. 1 chromic catgut on catgut needle  
(Figs. 40 and 41)  
If perineorrhaphy is done, use perineorrhaphy technic  
Vaginal pad and T-binder

#### HEMORRHOIDS

##### Instruments and sutures

Hemorrhoidal clamp (Kelsey)  
Small pointed knife  
Four curved forceps (Carmalt) (Fig. 34)  
Asbestos paper and soldering irons

Internal hemorrhoids: one-half strand of No. 1 catgut on needle (Figs. 40 and 41)

Dressing: Vaseline and vaginal pad

## RECTAL FISTULA

### Instruments and sutures

Two small probes (Fig. 97)

Five stomach clippers (Ochsner) (Fig. 56)

Straight forceps (Fig. 33)

Sharp dissecting scissors (Mayo) (Fig. 46)

Cutting scissors (Fig. 37)

Tissue forceps (Fig. 35)

Retractors (Pynchon, Deaver) (Figs. 77 and 95)

Plain catgut for ligating

No. 1 plain catgut for sewing (Figs. 40 and 41)

Iodin or methylene blue to be injected

Sometimes silk on catgut needle (Murphy) with needle-holder (Fig. 41)

Dressing: Vaseline and vaginal pad

## VESICULECTOMY

### Instruments and sutures

Ordinary instruments

Sharp retractors (Murphy) (Fig. 81)

Deaver retractors (Fig. 73)

Tongue depressor (Fig. 74)

Fork retractor

Sounds (sizes 10, 12, 14, 16, and 18, English), Ferguson-Otis-van Buren (Figs. 88 and 89)

K Y for lubricating

No. 1 catgut on catgut needle with holder (Figs. 40 and 41)

Six or eight silkworm sutures on finger needle (Fig. 80)

Strip iodoform gauze

Catheters (sizes 8 and 10, English) for urethra.

## PREPARATION OF PATIENT FOR OPERATIONS ON THE THORAX

If the chest is to be approached anteriorly, the patient is draped and placed on the table as for laparotomy. It is important to have sufficient exposure. A foot rest is used on the table.

For the approach to the posterior chest, or through axillary lines, the patient is placed on his side between two supports, usually long pillows, these being drawn together by means of a bandage at each end. The body may be moved, and the chest fixed in any position desired by means of the supports. The upper arm is tied with a bandage, pulled forward back of patient's neck, and tied by the anesthetist. The other arm is extended and tied on a board. The leg, resting on the table, is extended. The other leg is brought down on the table almost at a right angle, and placed against the other leg at the bend of the knee. A firm hitch is taken on the ankle of the leg with a goiter roll, and fixed to the table. The roll is carried under the table to the opposite side, then the bandage is fixed again, carried over and attached to the extended leg, just above the ankle, and then carried across the table to the starting point. A strap is placed across at the knees. The patient is draped. The table is well away from operative field, and usually the upper end rests over the symphysis.

### PLASTIC OPERATION FOR CHRONIC EMPYEMA

#### Instruments and sutures

Drapery (eight towels, eight clips, laparotomy sheet)

Ordinary instruments (knife, scissors, hemostats, tissue forceps, probe, and so forth)

Sharp retractors (Fig. 81)

Dull retractors (Fig. 75)

Self-retaining retractors (Fig. 106)

Four-pronged retractors (Fig. 70)

Two record syringes

0.5 per cent novocain solution  
Assorted needles  
Periosteal elevators (Figs. 102 and 103)  
Rib shears (Fig. 104)  
No. 1 plain catgut, double, on cervix needle  
Iodoform gauze packs

#### OPEN DRAINAGE OF EMPYEMA CAVITY

##### Instruments and sutures

Drapery as for chronic empyema  
Ordinary instruments  
Sharp retractors (Fig. 81)  
Self-retaining retractors (Fig. 106)  
Two record syringes  
0.5 per cent novocain solution  
Assorted needles  
Periosteal elevators (Figs. 102 and 103)  
Rib shears, two types (Figs. 104 and 105)  
No. 1 plain catgut on catgut needle  
Long drainage tubes  
Large catheters, 20 to 30 French  
Strip of 2-inch iodoform gauze

#### INSERTION OF CATHETER FOR CLOSED DRAINAGE OF EMPYEMA

##### Instruments and sutures

Drapery as for chronic empyema  
Ordinary instruments  
Fine-bladed knife  
Record syringes  
0.5 per cent novocain solution  
Assorted needles  
Trocar  
Cannula  
22 French catheter tube clamp  
1 oz. glass syringe  
Basin saline solution

## DRAINAGE OF LUNG ABSCESS

### Instruments and sutures, first stage of operation

Drapery (eight towels, eight clips, laparotomy sheet)  
 Ordinary instruments  
 Sharp retractors (Fig. 81)  
 Dull retractors (Fig. 75)  
 Two record syringes  
 0.5 per cent novocain solution  
 Assorted needles  
 Periosteal elevators (Figs. 102 and 103)  
 Rib shears, two types (Figs. 104 and 105)  
 Self-retaining retractor (Fig. 106)  
 No. 0 chromic catgut, double, on full curved fine catgut needle  
 2-inch iodoform gauze pack  
 No. 1 plain catgut, double, on catgut needle  
 Four or five silkworm sutures  
 Dermal suture

### Instruments and sutures, second stage of operation

Drapery as for first stage  
 Ordinary instruments  
 Two record syringes  
 0.5 per cent novocain solution  
 Assorted needles  
 Sharp retractors (Fig. 81)  
 Dull retractor (Fig. 75)  
 Record syringes with large needles  
 Electric cautery (Fig. 144)  
 Split tube  
 Iodoform pack

## RESECTION OF TUMOR OF CHEST WALL

### Instruments and sutures

Same as for first stage, lung abscess

## EXTRAPLEURAL THORACOPLASTY

**Instruments and sutures**

Drapery (eight towels, eight clips, laparotomy sheet)  
Ordinary instruments  
Sharp retractors (Fig. 81)  
Two record syringes  
0.5 per cent novocain solution  
Assorted needles  
Self-retaining retractor (Fig. 106)  
Periosteal elevator (Figs. 102 and 103)  
Blunt goiter retractors (Fig. 75)  
Rib shears, two types (Figs. 104 and 105)  
Saline to wash wound  
Absolute alcohol in syringe with fine needle  
Syringe with water  
No. 1 plain double catgut  
Dermal suture

## PREPARATION OF PATIENT FOR BREAST OPERATION

Practically all the patients are placed on the table and draped so that a radical amputation may be performed without change of position or draping. The patient lies well toward the foot of the table and toward the edge opposite the breast to be oper-



Fig. 15.—Breast position undraped.

ated on. Assuming that the right breast is to be removed, the patient lies well toward the left edge and the foot of the table. The right arm is extended laterally and slightly upward so that an angle of about 120 degrees is formed in the axilla by the arm and the body. The arm rests on a board extending under the pad

on the operating table, and is held in position by a gauze bandage passed around the wrist and the board. A strap is passed over the thighs and the left wrist is strapped in the usual position. A blanket is wrapped around the feet and ankles. A stirrup holder is placed on the left edge of the table as far toward the head as possible. The lower part of the body is covered with a sheet, and the instrument tray is placed just distal to the umbilicus.



Fig. 16.—Breast position draped.

After the usual treatment with benzin, ether, and the first coat of iodine, four sterile towels are placed around the breast to be operated on. The instrument tray is covered by a small sheet placed across the patient just distal to the operative field. Above the operative field is placed another small sheet, one end of which covers the board supporting the right arm, and the

other end passing over the top of the stirrup holder forms a screen for the anesthetist. A wet towel is placed along the posterior axillary field. Towels and sheets are held in place by Backhaus clips (Figs. 15 and 16).

## AMPUTATION OF BREAST

### Instruments and sutures

- Large scissors (Fig. 37)
- Four scalpels
- Dissecting scissors (Fig. 36)
- Tissue forceps (Fig. 35)
- Large number of straight forceps (Fig. 33)
- Two curved forceps (Fig. 34)
- Two sharp retractors (Murphy) (Fig. 81)
- Two-prong retractors (Collins) (Fig. 71)
- No. 1 plain catgut for ligating
- From eight to ten silkworm sutures on finger needle (Bonney) (Fig. 80)
- Dermal sutures on Keith needle (Fig. 43)
- Spiral tube if drain is used
- Quantity of hot packs (put in boiling water and wrung dry, Fig. 27)
- One-half strand No. 1 plain catgut on small Mayo trocar if small tumor is removed from breast (Fig. 42)
- Curved needle (Fig. 92) to close subcuticular fascia
- About three silkworm sutures used for Warren operation
- Finger needle (Bonney) (Fig. 80) and dermal suture on Keith needle (Fig. 43)

## PREPARATION OF PATIENT FOR OPERATIONS ON THE NECK

The patient's gown is replaced by a surgical jacket, and he is moved on the table so that his shoulders are just over the break between the body of the table and the head piece. The foot rest is brought up snugly against the soles of his feet. A strap is fastened across the thighs, and the wrists are strapped



Fig. 17.—Neck position.

to the sides of the table. Pillows are placed under the elbows, and the feet and ankles are covered with a blanket. A sheet is spread over the patient up to the shoulders, and the instrument tray is placed distal to the operative field. The foot piece of the table is lowered until it forms an angle of about 30 degrees with the horizontal. The head of the table is elevated

until the entire table is in line with the foot piece, so that the patient lies at an angle of about 30 degrees with the horizontal.

The neck is cleansed with benzin and ether, and the first coat of iodine is applied. In exophthalmic goiter 1.75 per cent tincture, and in other cases, 4 per cent tincture is used. Two sterile towels are opened and laid one above the other under the patient's neck and head. The sides of the upper towel are brought up over the patient's ears and hair, and fastened over the forehead. Another sterile towel is placed on each side of the operative field. The tray is covered by a small sheet distal to the operative field. Another small sheet is placed above the operative field, and passed over the screen, and at the angle of the mandible on each side is fastened with a curved clamp to the towel covering the head, and with two Jones clips, to the top of the screen. A wet sterile towel is placed on each side of the operative field and another coat of iodine is applied. The head is lowered just before starting the operation, and raised again before starting to sew up (Fig. 17).

### GOITER (LIGATION)

#### Instruments and sutures

Two small blunt retractors (Crile) (Fig. 90)

Two small sharp retractors (Sands) (Fig. 91)

Straight forceps (Fig. 33)

Tissue forceps (Fig. 35)

Dissecting scissors (Fig. 36)

Cutting scissors (Fig. 37)

Scalpel

One ounce 0.5 per cent novocain injected

One-half strand No. 1 plain catgut for ligating

One-half strand No. 00 plain catgut on catgut needle (Figs. 40 and 41)

Put up small curved horsehair needle (Fig. 92)

Dressing consists of three small sponges (Fig. 26)

Twenty cubic centimeter record syringe with needle to inject novocain

## THYROIDECTOMY

**Instruments and sutures**

- Sterile gauze for ether cone
- Large number of straight forceps (Fig. 33)
- Tissue forceps (Fig. 35)
- Dissecting scissors (Fig. 36)
- Cutting scissors (Fig. 37)
- Scalpel
- Large number of sponges (Fig. 26)
- Sharp retractors (Murphy) (Fig. 81)
- Blunt retractors (Green) (Fig. 75)
- Quantity of catgut used depends on size of goiter (No. 1 plain catgut for ligating)
- One-half strand No. 1 plain catgut on catgut needle for sewing where gland was removed (Figs. 40 and 41), sometimes goiter needle (Fig. 93)
- One-half strand No. 1 plain catgut for sewing muscle
- Plain No. 00 catgut on Keith needle
- Tube drain, safety pin

## OPERATIONS FOR GLANDS OF NECK

**Instruments and sutures**

- Large number of straight forceps (Fig. 33)
- One pair large scissors (Fig. 37)
- One pair dissecting scissors (Fig. 36)
- Tissue forceps (Fig. 35)
- Scalpel
- Two sharp retractors (Murphy) (Fig. 81)
- One round gland retractor (Parker) (Fig. 94)
- Two-prong retractors for block or complete dissection (Fig. 71)
- Large quantity No. 1 plain catgut
- One-half strand No. 1 plain catgut (Figs. 40 and 41)
- Dermal sutures on Keith needle (Fig. 43)
- Two spiral tubes for drainage
- Two safety pins

## THYROTOMY

### Instruments and sutures

Ordinary goiter instruments  
 Sharp retractors (Murphy) (Fig. 41)  
 Blunt retractors (Green) (Fig. 75)  
 Fibroid hooks (Fig. 62)  
 Bone cutter (Fig. 96)  
 Stomach clippers (Ochsner) (Fig. 56)  
 No. 1 chromic catgut on catgut needle (Figs. 40 and 41)  
 No. 1 plain catgut for ligating  
 Luer tracheotomy tubes (sizes 3, 5, and 7)  
 If the growth is small, sew up tight; do not use tube

## TRACHEOTOMY

### Instruments and sutures

Straight forceps (Fig. 43)  
 Dissecting scissors (Fig. 36)  
 Small scalpel  
 Tissue forceps (Fig. 35)  
 Two stomach clippers (Ochsner) (Fig. 56)  
 Two sharp hooks  
 Luer tracheotomy tubes (sizes 3, 5, and 7)  
 No. 1 catgut for ligating  
 No. 1 catgut on catgut needle (Figs. 40 and 41)  
 Silkworm sutures on finger needle (Bonney) (Fig. 80)  
 Small piece iodoform gauze

## LARYNGECTOMY

### Instruments and sutures

Ordinary instruments  
 Two sharp retractors (Murphy) (Fig. 81)  
 Blunt retractors (Fig. 75)  
 Fibroid hooks (Fig. 62)  
 Stomach clippers (Fig. 56)  
 Bone cutter (Fig. 96)

Luer tracheotomy tubes (sizes 3, 5, and 7)  
Swab trachea with 10 per cent cocain  
No. 1 chromic catgut on catgut needle (Figs. 40 and 41)  
No. 1 plain catgut for ligating  
No. 1 plain catgut on needle (Figs. 40 and 41)  
Dermal sutures on Keith needle (Fig. 43)

#### OPERATION FOR DIVERTICULUM OF ESOPHAGUS

##### Instruments and sutures

Ordinary instruments  
Sharp retractors (Murphy) (Fig. 81)  
Blunt goiter retractors (Green) (Fig. 75)  
Gland retractors (Parker) (Fig. 94)  
Small retractors (Deaver) (Fig. 95)  
No. 1 plain catgut for ligating  
No. 0 chromic catgut on small curved intestinal needle  
(Murphy) (Fig. 41)  
No. 1 plain catgut on catgut needle with holder for muscle  
Skin closed with dermal sutures (Fig. 43)

## CRANIOTOMY WITH OSTEOPLASTIC FLAP

A large number of pointed, or Kelly forceps, are supplied. The incision is made at the base of the flap in front and back,



Fig. 18.—Instruments for operation on the brain:

- |   |                                    |
|---|------------------------------------|
| a. DeVilbiss bone biters                  | m, n, and o. Pituitary forceps     |
| b. Hudson drill                           | p. Bayonet forceps                 |
| c. Straight bone biters                   | q, r, and s. Periosteal elevator   |
| d. Special curved bone biters             | t. Laminectomy periosteal elevator |
| e. Large curved bone biters               | u. Dural hook                      |
| f. Straight double-jointed bone biters    | v. Aneurysm needle                 |
| g. Dural guide                            | w. Knot tier                       |
| h. Pedicle clamp                          | x. Blunt hook                      |
| i and j. Illuminated pituitary retractors | y. Right-angled knife              |
| k. Illuminated ganglion retractors        | z. Brain trocar and cannula        |
| l. Brain retractors                       | a'. Dural forceps                  |
|   | b'. Ganglion scissors              |

then a periosteal elevator (Fig. 18 s) is inserted under the flap, and the pedicle clamp (Fig. 18 h) is applied. Following this the scalp incision is completed around the flap. The forceps are bunched together with rubber bands, and three wet wound towels are applied to the edge of the wound. The trephine openings are made with a Hudson drill (Fig. 18 b), then the dural guide (Fig. 18 g) is inserted under the bone, followed by the Gigli saw (Figs. 19 and 20) and the bone sawed out between the trephine openings. The DeVilbiss bone biter (Fig. 18 a) is used to bite away the bone at the lower margin of the bone flap and the flap is turned back. The dural vessels are ligated



Fig. 19.—Gigli saw.



Fig. 20.—Gigli handle.

with silk on small dural needles, and large flat pads of wet cotton are applied around the margin of the wound. The dura is opened with a dural hook (Fig. 18 u) and a scalpel. Usually a brain trocar and cannula (Fig. 18 z) is employed to make several punctures at this stage; to open the dura, a special straight scissors and dural forceps are used. At this stage a grooved director and brain retractor (Fig. 18 l) are usually necessary. For bleeders on the cortex of the brain, Cushing's clips (Fig. 21) instead of ligatures are employed; these should always be ready. Instead of sponging the cortex, it is irrigated (Fig. 22); if sponging is necessary, it is done with balls of fluffy cotton wet with

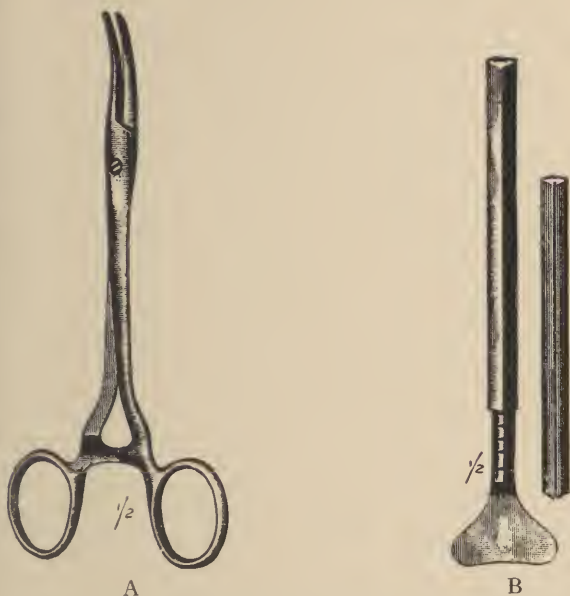


Fig. 21.—A. Cushing clip forceps; B. Cushing clip holder.

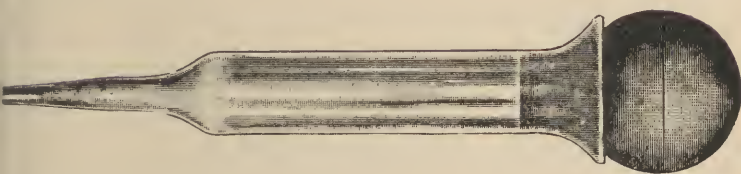


Fig. 22.—Hospital asepto syringe.

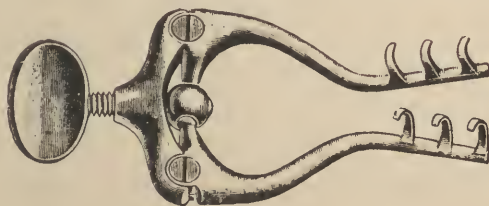


Fig. 23.—Jansen mastoid retractor.

sodium chlorid solution, using the bayonet forceps (Fig. 18 p). At the completion of the operation, bone biters (Fig. 18 f) are employed to bite out the bone for decompression, and the flap is replaced. For suturing the flap, trocar-pointed scalp needles are used (Ferguson No. 4). It is preferable to supply two or three dozen of these threaded with No. 1 silk, cut to convenient length for tying.

### CRANIOTOMY WITH OSTEOPLASTIC FLAP

#### Instruments and sutures

- Pedicle clamp (Fig. 18 h)
- Bone biter (DeVilbiss) (Fig. 18 a)
- Drill (Hudson) (Fig. 18 b)
- Dural guide (Fig. 18 g)
- Bone biters (Stille)
- Large curved bone biters (Fig. 18 e)
- Straight bone biters (Fig. 18 f)
- Dural forceps
- Brain trocar and cannula (Fig. 18 z)
- Dural hook (Fig. 18 u)
- Periosteal elevators (Fig. 18 q, r, s)
- Bayonet forceps (Fig. 18 p)
- Brain retractors (Fig. 18 l)
- Saw and handle (Gigli) (Figs. 19 and 20)
- Dural needles threaded
- Scalp needles (trocar point)
- Special irrigating syringe (Fig. 22)
- Cushing's clips (Fig. 21)

### PITUITARY OPERATIONS

#### Instruments and sutures

- Same as for craniotomy
- Pituitary forceps (Fig. 18 m, n, o)
- Illuminated retractor (Fig. 18 i, j)
- Gallbladder scoops
- Strips of rubber tissue for shingling brain

## GASSERIAN GANGLION OPERATION

The patient is placed with the head rest in the proper position and the incision is made in front of the ear. Ordinary straight forceps are supplied to catch the bleeders. Plain catgut on a catgut needle is used to retract the fascia and a mastoid retractor (Fig. 23) is inserted. A trephine opening is made and enlarged with bone biters (Fig. 18 c). The dura is elevated with a periosteal elevator (Fig. 18 q) and a brain retractor, the surgeon using a headlight. Illuminated ganglion retractors are inserted and the dissection carried out with bayonet forceps (Fig. 18 p) and four sizes of dental rolls. The middle meningeal artery is dissected loose with a right-angled hook (Fig. 18 x), the aneurysm needle (Fig. 18 v) threaded with silk is passed around the middle meningeal, and the loop caught with a dural hook. The knot is tied with a special knot tier (Fig. 18 w), and the silk and the middle meningeal are cut with special ganglion scissors (Fig. 18 b'). The dissection is continued until the root is exposed, and two blunt hooks are used, followed by a right-angled knife (Fig. 18 y) to cut the root. A gauze drain is inserted, and the wound sutured as in the operation for craniotomy.

**Instruments and sutures**

- Drill (Hudson) (Fig. 18 b)
- Bone biters, straight (Fig. 18 c)
- Bone biters, special curved (Fig. 18 d)
- Bone biters (Stille)
- Bone biters, straight double-jointed (Fig. 18 f)
- Periosteal elevators (Fig. 18 q, r, s)
- Bayonet forceps (Fig. 18 p)
- Brain retractor (Fig. 18 l)
- Illuminated retractors (Fig. 18 k)
- Dural hook (Fig. 18 u)
- Aneurysm needle (Fig. 18 v)
- Knot tier (Fig. 18 w)
- Blunt hook (Fig. 18 x)

Right-angled knife (Fig. 18 y)  
Ganglion scissors (Fig. 18 b')  
Container for cotton pledgets  
Mastoid retractor (Fig. 23)

### CRANIOTOMY FOR CEREBELLAR OPERATION

The patient is placed on the cerebellar head rest. A Heidenheim hemostatic stitch is inserted, using a cervix needle threaded with double chromic catgut. An ordinary cat's paw retractor and periosteal elevator (Fig. 18 s) are used for turning the flap. Trephine openings are made and the bone removed with bone biters (Fig. 18 e, f), bone wax being used to stop bleeding. A trephine and incision are made to tap the lateral ventricle, and a trocar inserted into the lateral ventricle. The dura is opened as in the operation for craniotomy. Illuminated retractors are usually used to examine the cerebellar pontile angles on each side. Closure is made with needles and silk as in the operation for craniotomy.

#### Instruments and sutures

Drill (Hudson) (Fig. 18 b)  
Bone biters, straight (Fig. 18 c)  
Bone biters, large curved (Fig. 18 e)  
Bone biters, double-jointed (Stille)  
Pituitary forceps (Fig. 18 m, n, o)  
Bayonet forceps (Fig. 18 p)  
Periosteal elevators (Fig. 18 q, r, s)  
Dural hook (Fig. 18 u)  
Brain trocar and cannula (Fig. 18 z)  
Dural forceps (Fig. 18 a')  
Illuminated retractor (Fig. 18 k)  
Brain retractor (Fig. 18 l)  
Cushing's clips (Fig. 21)  
Dural needles threaded with silk

## LAMINECTOMY

The incision is made. Straight forceps are supplied. The muscle attachment to the lamina is removed by a special periosteal elevator (Fig. 18 t) to a self-retaining goiter retractor, two wet towels are applied and the spinous process and laminae removed with bone-biting forceps (Fig. 18 c, e, f); bone wax is used to stop bone bleeding. Retraction sutures of silk in dural needles are inserted into the dura, and the dura is opened. Fluffy cotton balls on bayonet needles are used for sponging at this stage. Blunt hooks (Fig. 18 x) are used for lifting the cord, and Cushing's clips (Fig. 21) to control bleeding. The dura is closed with continuous silk on dural needles; the wound is closed with chromic catgut on large catgut needles and continuous dermal sutures in the skin.

### Instruments and sutures

- Bone biters, straight (Fig. 18 c)
- Bone biters, large curved (Fig. 18 e)
- Bone biters, double-jointed (Stille) (Fig. 18 f)
- Bone biters (Elsberg special)
- Bayonet forceps (Fig. 18 p)
- Periosteal elevators (Fig. 18 t)
- Dural hook (Fig. 18 u)
- Blunt hook (Fig. 18 x)
- Dural forceps (Fig. 18 a')
- Dural needle threaded

## BONE OPERATIONS

### Ordinary instruments

Hemostats

Tissue forceps

Scalpel

Dissecting scissors (Fig. 36)

Suture scissors (Fig. 37)

Sponges

Wound towels

Six Backhaus clips (Fig. 38)

Warm square packs

One-half strand No. 1 plain catgut for ligating

One-half strand No. 1 plain catgut on small catgut needle with needle-holder

Silkworm sutures on finger needles (Bonney)

Dermal on Keith needles (small finger needles are used for incisions on concave surfaces)

Warm square packs are necessary to prevent drying of tissues, especially if bone or fascia are being transplanted.

### BONE TRANSPLANT FOR FRACTURED FEMUR

#### Instruments

Ordinary instruments

Fracture table (Fig. 24)

Bone clamp (large and small) (Collins)

Beef-bone screws

Taps (Fig. 112)

Bone screw-driver (Fig. 135)

Electric saw and drill (Geiger) (Fig. 126)

Periosteal elevators (large and small) (Figs. 102 and 103)

Hand saws (Fig. 124)

Lane bone holders (Fig. 118)

Lion jaw forceps (Fig. 121)

Rongeur bone forceps (large and small) (Figs. 122 and 123)

Stille-Liston bone-cutting forceps (Fig. 105)

Retractors, sharp (Murphy) (Fig. 81)

Two-prong retractors (Collins) (Fig. 71)

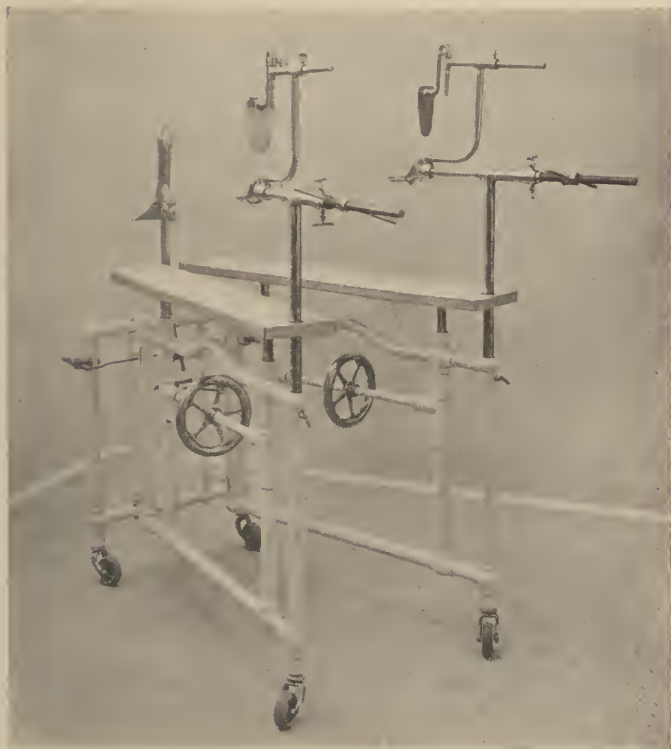


Fig. 24.—Fracture table.

Four-prong retractors (Israel) (Fig. 70)

Chisels (Fig. 138 c)

Gouges (Fig. 138 b)

Meyerding mallet (Fig. 129)

Three sterile cotton dressings

Sterile 5-yard gauze roll

If bone plate is used the same instruments are needed as for bone transplant except the electric saw

### APPLICATION OF METAL PLATE ON FEMUR

#### Instruments

Lane steel plate (six holes) (Fig. 134)

Lane steel plate (eight holes) (Fig. 133)

No. 7 Lane steel screws in five lengths

Simplex screw-holder and driver combined (Fig. 136)

Lane screw-driver (Fig. 135)

Dressing (gauze and cotton)

Materials for plaster-of-Paris cast

Meyerding sacral rest (Fig. 141)

### ARTHROPLASTY OF THE HIP

#### Instruments and sutures

Ordinary instruments

Bone drill

Periosteal elevators (large and small) (Figs. 103 and 130)

Hand saws (Fig. 124)

Lane bone holders (Fig. 118)

Rongeur bone forceps (Figs. 122 and 123)

Bone-cutting forceps (Fig. 120)

Meyerding mallet (Fig. 129)

Chisels (four sizes) (Fig. 138 c)

Sharp retractors (Murphy) (Fig. 81)

Four-prong retractors (Israel) (Fig. 70)

Murphy reamer and end mill brace with medulla (Figs. 115 and 117)

Reamers (four sizes) (Fig. 116)

No. 1 chromic catgut on catgut needle with holder

Ordinary sutures

Dressing

Material for plaster-of-Paris cast, or Thomas splint

Meyerding sacral rest (Fig. 141)

## ARTHROPLASTY OF ELBOW

**Instruments and sutures**

Ordinary instruments

Periosteal elevators (large and small) (Figs. 103 and 130)

Hand saws (Fig. 124)

Lane bone holders (Fig. 118)

Rongeur bone forceps (Figs. 122 and 123)

Bone-cutting forceps (Fig. 120)

Meyerding mallet (Fig. 129)

Chisels (four sizes) (Fig. 138 c)

Sharp retractors (Murphy) (Fig. 81)

Four-prong retractors (Israel) (Fig. 70)

Files (three sizes)

Bone screws

Yankee hand drill (Fig. 139)

No. 1 chromic catgut on catgut needle with holder

Ordinary sutures

Material for plaster-of-Paris cast, or special splint

## ARTHROPLASTY OF KNEE

**Instruments and sutures**

Ordinary instruments

Yankee hand drill (Fig. 139)

Periosteal elevators (large and small) (Figs. 103 and 130)

Hand saws (Fig. 124)

Lane bone holders (Fig. 118)

Rongeur bone forceps (Figs. 122 and 123)

Bone-cutting forceps (Fig. 120)

Meyerding mallet (Fig. 129)

Chisels (four sizes) (Fig. 138 c)

Sharp retractors (Murphy) (Fig. 81)

Four-prong retractors (Israel) (Fig. 70)

Reamers (four sizes) (Fig. 116)

Putti chisels

No. 1 chromic catgut on catgut needle with holder

Ordinary sutures

Tourniquet

Material for plaster-of-Paris cast, or special splint

### ALBEE BONE GRAFT TO SPINE

#### Instruments and sutures

Ordinary instruments

Sharp retractors (Murphy) (Fig. 81)

Two-prong retractors (Fig. 71)

Periosteal elevators (Figs. 103 and 130)

Murphy chisels (Fig. 127)

Meyerding mallet (Fig. 129)

Bone-cutting forceps (Fig. 120)

Long flexible metal probe (Fig. 128)

No. 2 chromic catgut on Mayo catgut needle

Electric drill (Geiger) (Figs. 125 and 126)

Bone screws

Tap and bone screw-driver (Figs. 108, 109, 110, 111, 112, and 113)

#### Instruments and sutures for leg

Ordinary instruments

Electric saw and bone drill (Geiger) (Figs. 125 and 126)

Thin chisel for removing bone graft (Fig. 138 c)

Meyerding mallet (Fig. 129)

Saline to cool electric saw

Three large sterile cotton dressings

Sterile 5-yard gauze roll

Bradford frame

### HIBBS' SPINAL FUSION OPERATION

#### Instruments and sutures

Ordinary instruments

Sharp retractors (Murphy) (Fig. 81)

Two-prong retractors (Fig. 71)

Periosteal elevators (Figs. 103 and 130)  
Murphy chisels (Fig. 127)  
Meyerding mallet (Fig. 129)  
Bone-cutting forceps (Fig. 120)  
Long flexible metal probe (Fig. 128)  
Two self-retaining retractors (Fig. 106)  
Small sharp periosteal elevators (Fig. 131)  
Hibbs' bone biters (Fig. 119)  
Small hand saw (Fig. 138 a)  
No. 2 chromic catgut on Mayo catgut needle  
Salt packs for bone chips

### OPERATION FOR FOREIGN BODY IN THE KNEE

#### Instruments and sutures

Ordinary instruments  
Sharp retractors (Fig. 81)  
Two-prong retractors (Fig. 71)  
Parker saw (Fig. 123)  
Second knife  
Tissue forceps (Fig. 35)  
Small gallbladder scoop (Fig. 51)  
Three sterile cotton dressings  
Large padded gutter splint

### RESECTION OF THE KNEE

#### Instruments and sutures

Ordinary instruments  
Sharp retractors (Fig. 81)  
Hand saw (Fig. 124)  
Rongeur bone forceps (Figs. 122 and 123)  
Bone-cutting forceps (Fig. 120)  
Two long wire nails  
Hammer (Fig. 68)  
Chisels (Fig. 138 c)  
Mallet (Fig. 129)

Three large cotton dressings  
Material for plaster-of-Paris cast  
Tourniquet

### AMPUTATION OF LEG

#### Instruments and sutures

Ordinary instruments  
Tourniquet  
Sterile leg rest (Fig. 140)  
Sharp retractors (Fig. 81)  
Two-prong retractors (Fig. 71)  
Amputation retractor (Fig. 142)  
Angular bone-cutting forceps (Fig. 143)  
Parker saw (Fig. 124)  
Two rubber tissue drains (for infected cases only)  
No. 2 chromic catgut for ligating large vessels  
Alcohol (95 per cent) in record syringe  
Two large cotton dressings  
Posterior splint for amputations below the knee

### OPERATION FOR BUNION

#### Instruments and sutures

Ordinary instruments  
Kelly straight forceps (Fig. 45)  
Mayo angular bone-cutting forceps (Fig. 143)  
Rongeur bone-cutting forceps (small) (Fig. 123)  
Bone-cutting forceps (Fig. 120)  
Chiropodist's cutting forceps  
Sharp retractors (Fig. 81)  
Ligation retractors (Fig. 91)  
Thin chisel (Fig. 138 c)  
Mallet (Fig. 129)  
Three stomach clippers (Fig. 56)  
Alcohol dressing  
Sterile tongue depressors

**SOUTTER OR CAMPBELL OPERATION FOR CONTRACTION OF HIP****Instruments and sutures**

Ordinary instruments

Chisels (Fig. 138 c)

Material for plaster-of-Paris cast

**OSTEOMYELITIS OF TIBIA****Instruments and sutures**

Ordinary instruments

Periosteal elevators (Figs. 103 and 131)

Bone gouges (Fig. 138 b)

Bone chisels (Fig. 138 c)

Meyerding mallet (Fig. 129)

Bone curet (Fig. 132)

Rongeur bone-cutting forceps (Figs. 122 and 123)

Yankee hand drill (Fig. 139)

Electric motor with drills and twin saws (for radical operation) (Figs. 125 and 126)

Iodoform gauze packing

Dakin tubes and manifold

Dakin gauze packing

Vaselin gauze

Safety pins

**BONE PLATE FOR FRACTURED RADIUS OR ULNA****Instruments and sutures**

Ordinary instruments

Periosteal elevators (Figs. 103 and 131)

Parker hand saw (Fig. 124)

Small hand saw (Fig. 138 a)

Rongeur bone-cutting forceps (Figs. 122 and 123)

Bone-cutting forceps (Fig. 120)

Chisels (Fig. 138 c)

Mallet (Fig. 129)

Bone plates (Fig. 114)

Bone screws (6 by 32, 10 by 24)

Electric motor (Geiger) (Fig. 125)  
Drills (Fig. 126)  
Taps (Figs. 108, 110, 111, 112, and 113)  
Bone screw-drivers (Fig. 109)  
Hand drill (Fig. 139)  
Lane bone holders (Fig. 118)  
Bone clamp (large and small) (Collins)  
Lion-jaw forceps (Fig. 121)  
Dressings  
Material for plaster-of-Paris cast

#### TRANSPLANTATION OF TENDON

##### Instruments and sutures

Ordinary instruments  
Tourniquet  
No. 0 chromic catgut on brain needle  
Silk on brain needle  
Narrow chisel (Fig. 138 c)  
Meyerding mallet (Fig. 129)  
Hand drill (Fig. 139)  
Stomach clippers (Fig. 35)  
Square saline packs  
Sterile dressings  
Material for plaster-of-Paris cast

#### GHANT OSTEOTOMY OF FEMUR

##### Instruments and sutures

Ordinary instruments  
Sharp retractors (Fig. 81)  
Four-prong retractors (Fig. 70)  
Two-prong retractors (Fig. 71)  
Chisels (Fig. 138 c)  
Osteotomes (Fig. 138 c)  
Mallet (Fig. 129)  
Extra large bone-screw with brace and small reamer (Figs. 115 and 116)

Hand drill (Fig. 139)  
Dressings  
Material for plaster-of-Paris cast

#### ARTHRODESIS OF ANKLE

##### Instruments and sutures

Ordinary instruments  
Sharp retractors (Fig. 81)  
Chisels (Fig. 138 c)  
Gouges (Fig. 138 b)  
Mallet (Fig. 129)  
Rongeur bone-cutting forceps (Figs. 122 and 123)  
Tourniquet  
Silkworm and dermal on curved needles  
Dressings  
Material for plaster-of-Paris cast

#### ASTRAGALECTOMY

##### Instruments and sutures

Ordinary instruments  
Chisels (Fig. 138 c)  
Mallet (Fig. 129)  
Rongeur bone-cutting forceps (small) (Figs. 122 and 123)  
Lion-jaw forceps  
Tourniquet  
Sutures on curved needles  
Dressings  
Material for plaster-of-Paris cast

#### FRACTURED PATELLA

##### Instruments and sutures

Ordinary instruments  
Bone screws  
Taps (Figs. 108, 110, 111, 112, and 113)  
Bone screw-drivers (large and small) (Fig. 109)

Electric motor (Geiger) (Fig. 125)  
Drills (Fig. 126)  
Sharp retractors (four) (Fig. 81)  
Tourniquet  
Chromic catgut No. 1 on curved catgut needle  
Silver wire  
Dressings  
Material for plaster-of-Paris cast

### THE METHOD OF MAKING PLASTER-OF-PARIS BANDAGES

The material for plaster-of-Paris bandages is starched crinoline and quick-setting dental plaster. The mesh of the crinoline is 30 by 32 strands to the square inch; a coarser mesh allows the plaster to drop out, and the bandages are not satisfactory. The plaster is the so-called "clover-leaf brand," and is designated as "quick-setting xx dental plaster."

The bandages are made as follows: The crinoline, 18 inches wide and about  $5\frac{5}{8}$  yards long, is spread on a long frame table, the plaster of Paris is rubbed into the meshes of the cloth, and the crinoline rolled on a special roller device until the roll is about 2.5 inches in diameter. By weight there are  $6\frac{4}{9}$  ounces of crinoline to  $21\frac{9}{10}$  ounces of plaster; about three parts of plaster to one part of crinoline. The plaster bandage roll is placed in a cutting device, and the bandages cut into either 4- or 8-inch widths. In the ordinary plaster boxes as supplied to the hospitals there are seventy-two 4-inch rolls of plaster, or thirty-six 8-inch rolls of plaster.

### The method of applying an ordinary cast

The extremity on which the cast is to be applied is covered with (1) stockinet of suitable width, (2) a layer of table felting, (3) a cotton sheet, and (4) a layer of paper bandage. Plaster bandages are soaked in cold water until the water stops bubbling in a pail equipped with a coarse wire drain to which is attached a suitable handle. When the water stops bubbling the wire screen is lifted by its handle, and the bandages allowed to drain

for a minute or two, after which they are wound about the part or member being treated. Each turn of the bandage is rubbed so as to make a smooth, well-fitting cast. If a leg or arm which has been operated on is being covered and there is a chance that swelling may occur, canvas suspension straps are incorporated in the cast so that the limb may be suspended by means of an



Fig. 25.—Plaster-of-Paris cart.

over-head Balkan frame. This technic prevents, to a great extent, swelling and the necessity of splitting the cast.

Figure 25 is a cart for the convenient handling of plaster-of-Paris bandages. It contains all material necessary for making the bandages, including stockinet, table felt, and silence cloth. A compartment is also provided for knives, and so forth, for removing the casts.

## OTHER MISCELLANEOUS OPERATIONS

### OPERATION FOR SPINA BIFIDA

#### Instruments and sutures

Usual preparation  
Dissecting instruments  
No. 0 or No. 1 chromic catgut on Crile needle  
Plain catgut on catgut needle  
Dermal  
Sterile cotton and tincture of benzoin

### LUMBAR PUNCTURE

#### Instruments and sutures

Needle and trocar  
Receptacle for fluid  
Sponges to wash parts  
Iodin swab  
Dressing

### SKIN GRAFTING

#### Instruments and sutures

Skin grafting retractors (Quin)  
One or two razors (sharp)  
One or two tissue forceps (fine)  
Pointed scissors (Mayo)  
Two or three forceps (Allis)  
One or two appendix invertors (Mayo)  
Salt solution  
Wire gauze  
Vaselin dressing where the skin was taken

## OPERATION FOR VARICOSE VEINS

**Instruments and sutures**

Rochester cutting scissors  
Dissecting scissors (Mayo)  
Vein strippers (Mayo)  
Sharp retractors (Murphy)  
Tissue forceps (Sands)  
Forceps (straight) (Ochsner)  
Forceps (Murphy)  
Forceps (curved) (Kelly)  
Catgut for tying  
Silkworms on large surgical needle  
Dermal on small surgical or Keith needle  
Dressing and sterile bandage

## OPERATION FOR PERIPHERAL NERVES

**Instruments and sutures**

Usual preparation  
Dissecting instruments  
Dural forceps  
Twelve forceps (Halsted)  
Sharp scalpels  
Crile needles (non-cutting)

## CIRCUMCISION

**Instruments and sutures**

Sharp pointed scissors (Mayo)  
Rochester cutting scissors  
Scalpel (fine)  
Six or eight anastomosis forceps (Allis)  
Eight or ten mosquito forceps (Halsted)  
No. 0 chromic catgut on intestinal or small surgical needle  
Sterile vaselin dressing  
No. 1 plain catgut  
Fine silk

## V-SHAPED EXCISION OF LIP

**Instruments and sutures**

Rochester cutting scissors  
Trachelorrhaphy scissors (Hanks)  
Scalpel  
Tissue forceps (Sands)  
Six to ten hemostats (Ochsner-Mayo)  
Two stomach clippers  
No. 1 chromic catgut on Mayo catgut needle  
Three or four silkworm sutures on surgical needles  
Dermal on small surgical needles  
Iodin

## OPERATION FOR HARELIP

**Instruments and sutures**

Tiny scalpel  
Eight mosquito forceps (Halsted)  
Six or eight forceps (Allis)  
Tissue forceps (Sands)  
Four artery clamps (Langenbeck)  
Periosteal elevators (Richardson)  
Silkworm sutures on tiny Crile needles  
Dermal on tiny surgical needles

## OPERATION FOR CLEFT PALATE

**Instruments and sutures**

Mouth gags (Denhardt)  
Small sharp pointed scissors (Mayo)  
Rochester small cutting scissors  
Eight or ten mosquito forceps (Halsted)  
Two fine and large tissue forceps (Sands)  
Small tongue depressor (Pyncheon)  
Periosteal elevators (Richardson)  
Periosteal elevators, two sizes (Allis)  
Eight anastomosis stomach clickers (Allis)  
Silkworm, tiny Crile needles

## TONSILLECTOMY AND ADENOIDECTOMY

**Instruments and sutures**

Mouth gag (Whitehead)

Small tongue depressor (Pynchon)

Small dissecting scissors (Mayo)

Four or five vulsellum forceps (Henrotin)

Tissue forceps (Sands)

Adenoid curet (Gottstein's)

## TECHNIC OF BLOOD TRANSFUSION

After the blood has been grouped in order to determine the compatibility of the blood of the prospective donor with that of the recipient, the technic of the blood citrate method involves: (1) The preparation of instruments and reagents; (2) the surgical preparation of the arm of the donor and of the recipient; (3) the withdrawal of blood from the vein of the donor; (4) the infusion of the withdrawn blood into the vein of the recipient.

### Instruments required

Glass graduate (500 c.c.)

Stirring rod

Rubber delivery tubes, 6 to 8 inches long, with needle (large, 13 to 15 gauge), sharp, polished on the inside, and preferably fitted with trocar

Glass salvarsan tube (500 c.c.) with 3 or 4 feet of rubber tubing having adapter attachment to the recipient's needle, and with one or more needles, is used for running the blood into the vein of the patient

Cambric needles (sizes 10, 12, or 14) for transfixing veins when necessary

Hypodermic syringe of novocain

The needles are boiled or, preferably, carbolized. All other utensils are boiled or sterilized, and all glassware and rubber tubing used in contact with the blood, are rinsed, and then boiled in distilled or soda water.

The reagent sodium citrate should be the purest obtainable crystalline salt, and may be obtained in 5 c.c. ampules containing 18 grains of the salt in solution in distilled water, enough to prevent coagulation in one pint of blood. In order that it may better mix with the blood, the citrate is dissolved in about 55 c.c. of 0.6 per cent saline made up with freshly redistilled water.

An extra portion of citrate solution is used for rinsing all glassware and tubing immediately before contact with the blood.

All new rubber tubing is thoroughly cleansed with a small buret brush and soaked for three days in 5 per cent sodium hydroxid and irrigated with tap water for a week or more.

The arm of the donor and the arm of the recipient are washed with benzin, painted with 3 per cent ticture of iodin, and draped with sterile towels so that the veins of the cubital fossa are exposed. The veins are made prominent by tightening the tourniquet above the elbow while the patient opens and closes his fist. The needle is inserted into the donor's vein, through an intradermal novocain wheal, pointing toward the hand.

The nurse holds the delivery tube leading from the donor's needle so that the stream of blood, without splashing or dripping, is directed into the citrate solution, which is stirred slowly and continuously with the glass rod until the desired amount of blood has been withdrawn. The tourniquet is kept only tight enough to block the venous flow above the elbow, while the donor slowly opens and closes his fist in order to maintain a steady stream of blood throughout the procedure.

Fifty cubic centimeters of saline solution is then poured into the salvarsan tube, and the air is removed from the long rubber delivery tube attached, which is then left pinched or clamped off while the needle is inserted into the recipient's vein in the direction of the venous blood flow.

The delivery tube is attached to the needle while blood is flowing from the patient and saline from the tubing so that no air may enter. Then the citrated blood is added. The first 100 c.c. of blood is allowed to run in slowly during five minutes or more, while the patient is watched and also instructed to report any unusual symptoms. The remainder of the blood is allowed to run in within from ten to fifteen minutes. If any questionable symptoms arise, the procedure is stopped and is not continued unless the changes noted are quite insignificant and transitory.

## ANESTHESIA

### ETHER ANESTHESIA

Ether is administered by the drop method on a chloroform mask covered with stockinet. When the anesthetist desires to obtain a more concentrated vapor, surgeons' gauze is folded over the stockinet, and the ether is dropped on the gauze.

As a precaution against cross infection, the anesthetist sterilizes her hands after each operation, resterilizes the mask, puts on a fresh piece of sterile stockinet, and uses fresh sterile gauze for making folds. At the end of the day's work, the pieces of stockinet and gauze are washed and sterilized to be used again.

### NITROUS OXID AND OXYGEN ANESTHESIA

Nitrous oxid and oxygen, commonly spoken of as gas oxygen anesthesia, is given by the closed method. The face mask is placed over nose and mouth with precaution that both are free; it is held in place by a towel and clamp and the sides are packed with cotton to prevent gas from escaping, and to exclude the air which would add nitrogen to the gas. The exhaling valve on the top of the mask may be used. The anesthetist has on hand an ample supply of oxygen. Cyanosis is not permitted even for a moment. Ether or local anesthesia is combined with nitrous oxid and oxygen to produce the deeper anesthesia.

If the face mask, breathing tube, and bag have been used in an infectious case, they are soaked in a solution of carbolic, 1:40, for two hours; otherwise it is washed with soap and water and immersed in a carbolic solution.

### REGIONAL ANESTHESIA

In the induction of regional anesthesia, procain (Metz) solutions are used. Injections are made with the Labat special syringe and needles for regional anesthesia.

### Preparation of the solution

Half physiologic salt solution (0.45 per cent) is prepared, boiled for ten minutes, let cool, and put in sterile bottles. This is called a sterile salt solution.

Twenty-five to 50 c.c. of sterile salt solution is heated to boiling point, and 2.5 gm. (the contents of one paper) of novocain powder is added. This gives a novocain solution. It is stirred for two minutes, and removed from the fire.

Seventy-five c.c. of salt solution is poured into a graduated glass, the novocain solution added, then completed with saline up to 250 c.c. for 1 per cent solution, or to 500 c.c. for 0.5 per cent solution. Larger amounts may be made up at a single boiling by using more papers of novocain and keeping in mind the amount of saline necessary to dilute to the required percentage of strength.

Ten drops of adrenalin solution to 100 c.c. of novocain is added just before use and after the novocain solution is cold.

One-half of 1 per cent solution (0.5 per cent) is used in infiltration and field block work, and 1 per cent solution for most nerve block procedures.

### APPARATUS USED IN REGIONAL ANESTHETIC PROCEDURES

The syringe and hypodermic needle are used in all local anesthetic work.

#### Field block

Two 8 cm. needles

Two 10 cm. needles

#### Caudal anesthesia

Two spinal puncture needles

#### Transsacral anesthesia

Two spinal puncture needles

Two 5 cm. needles

Two 8 cm. needles

Two 10 cm. needles

**Paravertebral nerve block**

Two 8 cm. needles

Two 10 cm. needles

**Splanchnic and parasacral anesthesia**

12 cm. needles

15 cm. needles

## MISCELLANEOUS

### STERILIZATION OF SYRINGE

The syringe is kept in a basin of 70 per cent alcohol. When needed for use the disconnected parts are passed through 10 per cent formalin solution, then rinsed twice in sterile distilled water. The syringe may also be sterilized by boiling; the plunger is always first disconnected from the barrel. The plunger is not forced into the barrel until both are cool.

### CARE OF NEEDLES

The needles are sterilized by boiling five minutes immediately before they are used. Stylets or sheaths are not removed. After needles, stylets, and sheaths have been used, they are wiped dry with sponges. If they are tarnished, they are polished with a very fine emery cloth. Needles are washed with ether.

Sheaths are dried by swabbing the inside with cotton applicators. A small amount of "three-in-one" oil is injected into the lumen of each needle and the exterior is anointed with oil. Stylets are inserted into the needles, and each needle is placed into its corresponding sheath.

### COTTON DRESSINGS

The bolt of gauze or the amount required is unrolled and spread on a table. The rolls of cotton are cut in two, unrolled, and placed in the middle of the strip of gauze. The edges are folded over, and the dressings cut in about 10-inch lengths. They are folded over twice and put in packages of six in a cloth wrapper.

### RAW-EDGED SPONGES

Gauze is cut in 4-inch squares, and placed in about a 2-inch pile in a cotton wrapper.

### ST. MARY'S HOSPITAL SPONGE (FIG. 26)

Gauze in bolts of 100 yards is used. The bolt is cut, taking about 20 folds at a time (Fig. 26 a), leaving about 15 yards on



Fig. 26.—St. Mary's Hospital sponge.

the bolt; the folded edge is cut (Fig. 26 b); this is cut oblong in two pieces about 9 by 18 inches (Fig. 26 c); the corners and then the lower raw edge are brought to the middle (Figs. 26 d, e, f); the upper edge is turned in  $\frac{1}{2}$  inch (Fig. 26 g); this is folded over so that the upper edge covers the lower edge (Fig. 26 h); it is then folded in three parts (Fig. 26 i), making approximately a  $2\frac{1}{2}$ -inch square (Fig. 26 j), or in two parts.

After these sponges have been used, they are laundered, stretched on a board in which nails have been driven about  $1\frac{1}{2}$  inches apart, then folded. They are afterward used for hot dressings or for cleansing patients with benzin.

#### ST. MARY'S HOSPITAL SQUARE PACK WITH MARKER (FIG. 27)

The bolt of gauze is cut as in making St. Mary's sponge. About 60 folds of the gauze gives material for 30 square packs.



Fig. 27.—St. Mary's Hospital square pack.

Two folds are doubled, making the pack eight thicknesses (Fig. 27 a); this is stitched around the edge except for about 3 inches at one end (Fig. 27 b); through this opening the pack is turned inside out; a piece of black tape 8 inches long with a metal ring



Fig. 28.—St. Mary's Hospital long pack.

at the end is prepared (Fig. 27 c), and inserted in corner of pack (Fig. 27 d), and the pack is stitched all around, and the ring is stitched in place to keep it stationary in the corner (Fig. 27 e).

To make tape for the packs the best quality of black sateen is torn in strips 1 to  $1\frac{1}{2}$  inches wide. Both edges are turned so that the width of the strip is about  $\frac{1}{2}$  inch; this is sewed and cut in 8-inch lengths.

#### ST. MARY'S HOSPITAL LONG PACK (FIG. 28)

Gauze 8 yards long and 18 inches wide is used. The edges are stitched, but it is not necessary to turn the gauze. A piece of tape is stitched in the right upper corner.

#### GOITER ROLLS

Five-yard lengths are cut from a bolt of gauze. Raw edges are turned under at each end, folded lengthwise, making material 9 inches wide, and rolled.

#### IODIN SWABS

Iodin swabs are made by folding gauze four times; this gives thicknesses of gauze 4 inches wide, which are cut in 3-inch lengths, and are put up in packages of twenty-five.

#### CAPS AND MASKS (FIG. 29)

##### Straight nose and mouth mask (Fig. 29 a)

Voile, double

Length, 8 inches; width, 9 inches

Two 26-inch tapes are drawn through hem at sides

##### Cap with band and circular top (Fig. 29 b)

Double muslin for band, soft India linen for top

Band,  $3\frac{1}{2}$  inches wide, 24 inches long

Top, circle 12 inches in diameter

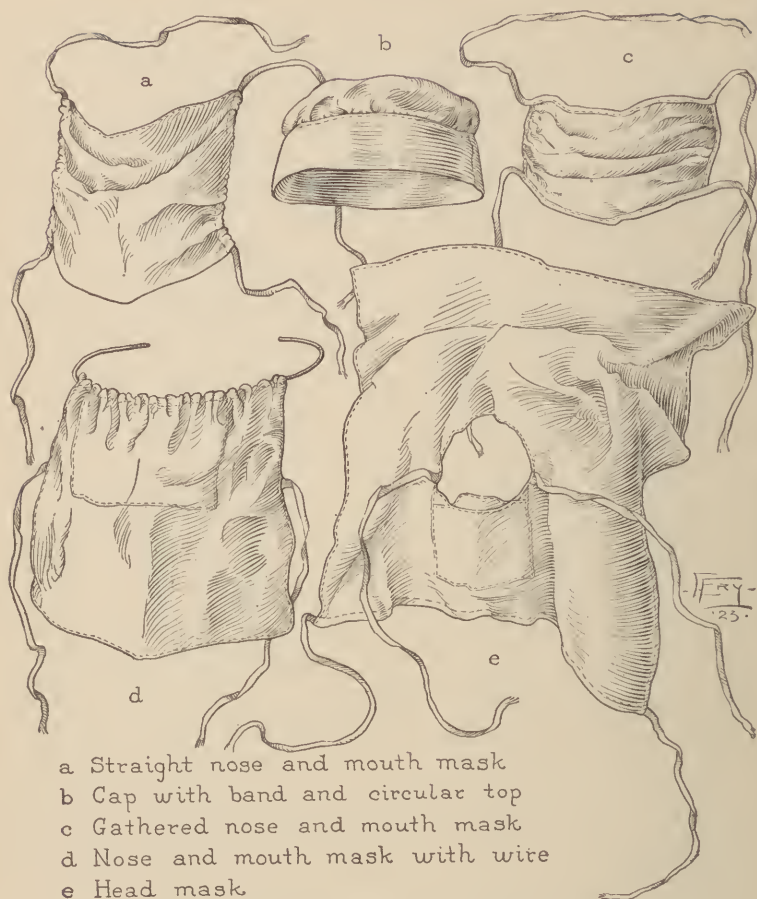


Fig. 29.—Caps and masks for operating room.

### Gathered nose and mouth mask (Fig. 29 c)

Voile, double

Length,  $7\frac{1}{2}$  inches; width, 8 inches

Width is shirred to a 3-inch length; the mask is bound with tape, and a 12-inch length of tape for tying sewed at each corner

**Nose and mouth mask with wire (Fig. 29 d)**

India linen or voile

Length, 12 inches; width, 14 inches

Doubled piece in center,  $5\frac{1}{2}$  inches long, 6 inches wide

Tape for tying is sewed on both sides,  $4\frac{1}{2}$  inches from the top.

A fuse wire 22 inches long is run through hem at the top, to go over the nose and back of the ears

**Head mask (Fig. 29 e)**

India linen or voile

Width, 18 inches; length, 21 inches

Opening for eyes, 6 inches from lower edge; length,  $6\frac{1}{2}$  inches; width, 3 inches

Doubled piece for mouth and nose, length  $4\frac{1}{2}$  inches; width,  $5\frac{1}{2}$  inches; shirred at tapering top to fit over nose

Two 9-inch tapes for tying are sewed at the lower end of mask, and two 14-inch tapes are sewed at each side of the opening

**STERILIZATION OF DRESSINGS AND VASELIN**

The dressings already wrapped are placed in the autoclave for one hour at 15 pounds pressure. The vaselin is put in jars of convenient size, and placed in the autoclave for the same length of time under the same pressure.

**PREPARATION OF SETS OF GLOVES**

A package is made containing

One small towel for each glove or pair of gloves

Two large towels

Newspapers

Gown

Powder

which is sterilized. Gloves are boiled fifteen minutes.

Hands and arms are scrubbed for ten minutes; nurse puts on gown, spreads the papers, and then the towels. Gloves are wiped and powdered, and wrapped in small towels, either singly or in pairs.

## SOLUTIONS

### Dichloramin-T

25 gr. of powdered dichloramin-T

1 oz. of fluid chlorcosane

Mix the powder with some of the fluid chlorcosane to make a smooth paste. Heat remaining fluid to 80° C. and combine with the mixture

### Tincture of iodine (7 per cent)

Apothecaries' weight

4 oz. 3 drs. of iodine crystals

3 oz. 1 dr. of potassium iodide

2 qts. of 90 per cent alcohol

Metric weight

140 gm. of iodine crystals

100 gm. of potassium iodide

2 liters of 90 per cent alcohol

### Ochsner's (500 c.c.)

100 c.c. distilled water

100 c.c. alcohol

300 c.c. boric acid

30 c.c. carbolic (making approximately a 5 per cent solution)

### Balsam Peru in castor oil (5 per cent solution)

4000 c.c. castor oil

200 c.c. balsam Peru

Warm castor oil to 80° C.; add balsam Peru

### Chinisol (2 per cent solution)

16 oz. distilled water

154 gm. chinisol powder

66 gm. sodium chlorid

Mix well, shake vigorously, strain through piece of sterile gauze; handle with sterile forceps

### Chlorid of lime

10 pounds of chlorid of lime

20 pounds of soda (Wyandotte)

Ten pounds of chlorid of lime are placed in jar and 20 pounds of soda (Wyandotte) in tube, a pail of cold water is poured on the lime, and it is left to dissolve. Cold water is poured on the soda; this is poured into the lime, and stirred quickly or the lime will burn (the lime is not poured on the soda). This makes 40 gallons of chlorid of lime

### Glucose (10 per cent)

This is prepared in the laboratory and given the same as a blood transfusion

### Calcium preparation

In sterile towel are placed

Two 10 c.c. syringes (Luer)

Needles

Sponges

Alcohol for cleansing

Pair of forceps

5 c.c. 10 per cent calcium chlorid in ampule

Tourniquet

### Preparation of materials used in subcutaneous injection of salt solution

95 per cent alcohol

5 per cent carbolic

Sterile water

Sandpaper



Fig. 30.—Salt solution ready for subcutaneous injection.



Fig. 31.—Giving a patient the subcutaneous injection of salt solution.

Sterile gloves are worn. The needles are sandpapered, wired, and placed in alcohol. The bottle is uncorked, and bottle with tubing is immersed in 5 per cent carbolic acid, rinsed with 5 per cent alcohol and with sterile water; filled with sterile sodium chlorid solution (18 gm. salt to 2000 c.c. water), and corked. The needle, attached to the tubing, is placed in a sterile towel, and the tubing wrapped around the neck of the bottle. Two strips of adhesive are attached to the bottle. Small package of sponges, swab, and iodine are required for the preparation of the patient for the injection (Figs. 30 and 31).

## DRAINS

### Gutta percha

The gutta percha is washed with soap and water, cut into desired lengths, each piece rolled in gauze and placed in 1:1000 solution bichlorid of mercury.

### Rubber tubing

New tubing is boiled for one hour before using it the first time. Thereafter it is boiled with the instruments when it is needed.

### Penrose tubing

Boiled fifteen minutes and placed in a sterile jar.

### Vaselin gauze

Into a porcelain pan with cover is placed a layer of 1-inch, 2-inch, or 3-inch gauze, then a layer of vaselin, and so on alternately until the pan is filled; it is then sterilized in autoclave for one hour.

### Vaselin-iodoform gauze

Sterile iodoform gauze is dipped into melted sterile vaselin.

### Iodoform gauze (2.5 per cent)

A solution is made of

500 c.c. soapsuds (green soap)

25 c.c. iodoform powder

This is about enough for seven bandages. After mixing thoroughly, bandages are unrolled, placed in the solution, and wrung dry; they are then rolled, wrapped separately in gauze, and boiled for fifteen minutes. Sterile gloves are worn to wring the bandages dry. A number of sterile towels are wrapped around the bandages, and they are hung in a warm place, or placed in a warm autoclave for about two days. When dry, they are placed in a dark sterile jar.

**Iodoform gauze**

A solution is made of

180 c.c. soapsuds (green soap)

25 c.c. iodoform powder

10 c.c. glycerin

The glycerin and iodoform powder are mixed and then sterilized in the autoclave for one-half hour at 15 pounds pressure. The sterile salt solution is added, and the sterile bandages are placed in the solution, wrung dry, and rolled. They are kept in a dark, covered jar.

## SUTURES

### Dermal

The outer two paper covers are removed, and the dermal with the third cover on is boiled for two minutes

### Silkworm

This is boiled from ten to fifteen minutes and placed in 4 per cent iodine for five days before using to render more pliable

### Silk

This is boiled for fifteen minutes and placed in 70 per cent alcohol

### Chinese twist and silk Irish linen

This is boiled from ten to twelve minutes and preserved in 75 per cent alcohol or 1:1000 bichloride

### Catgut tubes

These are scrubbed with soap and water, washed in running water, and placed in 5 per cent carbolic for forty-eight hours. The tubes are covered with double layer of gauze. Before using, tubes are washed in sterile water

### INTERN'S DRESSING BASKET (Fig. 32)

Instrument cup for sterile instruments  
Instrument cup for used instruments  
Half-cup 3 per cent carbolic containing  
Eight curved forceps  
Eight tissue forceps  
Eight scissors



Fig. 32.—Intern's dressing basket.

Bottle of 3 per cent iodin  
Bottle of 50 per cent alcohol  
Bottle of sterile vaselin  
Papers to receive soiled dressings  
Three-inch and 4-inch roller bandages  
Two packages of large dressings

Two packages of small dressings

Package of raw-edged sponges

Three rolls of adhesive

Adhesive roller

Iodin swabs

## TRAYS

### Tracheotomy set

- Tracheotomy tube
- Scalpel
- Retractors (6 straight, 2 curved)
- Catgut
- Needle and holder
- Tissue forceps
- Scissors
- Dressings
- Sterile gloves

### Eye

- Package of sterile sponges
- Small bottles containing
  - Boric acid solution
  - Argyrol (10 per cent)
  - Albolin
- Eye shield
- Adhesive

### Uterine hemorrhage

- Two pairs sterile gloves
- Uterine packer
- Vaginal pack
- Sterile towels
- Tissue forceps (Kelly) (Fig. 17)
- Gauze
- Tube of iodoform gauze

### Abdominal hemorrhage

- Two pairs sterile gloves
- Six straight forceps

Two curved forceps  
Tissue forceps (Kelly) (Fig. 17)  
Scalpel  
Needles and holder  
Catgut  
Tube of iodoform gauze  
Dressings  
Scissors  
Adhesive  
Sterile towels

### Aspiration

Small dish containing  
Scalpel  
Syringe and aspirating needles  
Sterile culture tube  
Aspiration tube  
Adhesive  
Catgut  
Needles and holder  
Scissors  
Tissue forceps  
Dressings (small and large)

### Intravenous

Five sterile towels  
Two curved hemostats  
Tourniquet  
Knife for incision  
Small knife  
Tissue forceps  
Fine tissue forceps  
Scissors  
Small sharp pointed scissors  
Four small pointed forceps  
Cannulas (2 sizes)

Salvarsan tube (500 c.c.)  
Two yards rubber tubing  
Graduate (500 c.c.)  
One Lewisohn needle, 15 gauge  
No. 0 catgut for tying  
One-half strand dermal on dermal needle

## SETS OF STERILE LINEN

### Laparotomy

Laparotomy sheets  
Seven towels  
Three wound towels  
Dressings  
Fifty sponges used as wipes, and not counted  
Sheet for anesthetist's screen

### Goiter

Eight towels  
Two sheets  
Fifty sponges  
Gauze for the cone

### Lithotomy

Three towels  
One wound towel  
Fifty sponges  
Lithotomy sheet

### Kraske

Laparotomy sheet  
Seven towels  
Fifty sponges

### Kidney

Same as for Kraske

### Breast

Two small sheets  
Eight towels  
100 sponges

## TO OPERATE AUTOCLAVE

Open safety valve on top of autoclave  
Open steam chamber and vacuum  
Open waste pipe before filling autoclave with water  
Open steam supply  
Close steam chamber  
Lower safety valve when it sputters  
Get steam up to 15 pounds pressure  
Then open steam chamber until there are 5 inches of vacuum  
Close vacuum valve  
When right and left gauge register 15, begin to count  
Sterilize for one hour  
Close steam chamber  
Open vacuum valve until it drops to 5, then open steam chamber  
until there are 5 inches of vacuum  
Close steam chamber  
Close vacuum valve, being sure to have steam chamber closed  
first  
Turn off steam supply  
Open door

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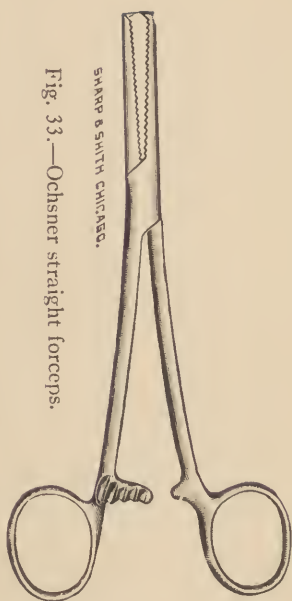


Fig. 33.—Ochsner straight forceps.

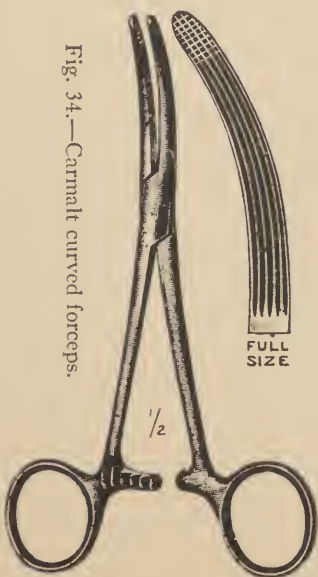


Fig. 34.—Carmalt curved forceps.



Fig. 35.—Kelly tissue forceps, one tooth.

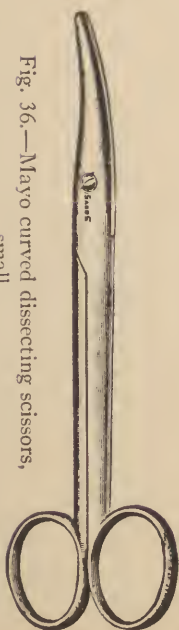


Fig. 36.—Mayo curved dissecting scissors, small.



Fig. 37.—Ferguson angle on flat scissors.

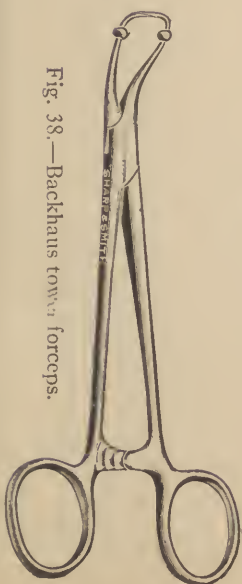


Fig. 38.—Backhaus towel forceps.



Fig. 39.—Fritsch abdominal retractor.



Fig. 41.—Hegar needle holder.



Fig. 43.—Keith straight needle.



Fig. 40.—Mayo catgut needle.

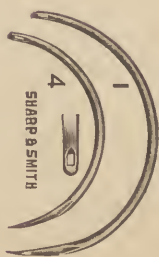


Fig. 42.—Mayo trocar needle.



Fig. 44.—Mayo appendix invertor.

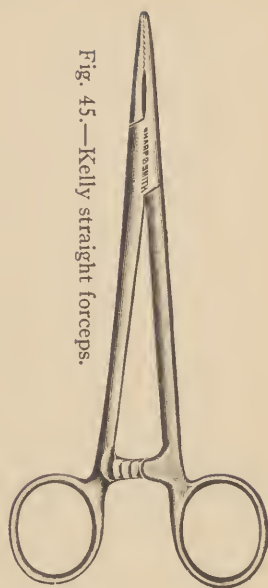


Fig. 45.—Kelly straight forceps.

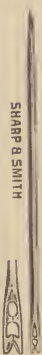


Fig. 47.—Calix-eyed intestinal needle.



Fig. 46.—Curved scissors.

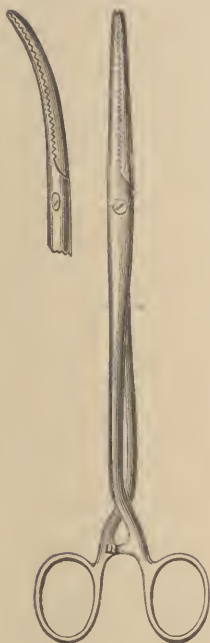


Fig. 48.—Fenger curved forceps.



Fig. 49.—Kelly 9-inch tissue forceps.



Fig. 50.—Ochsner gallbladder trocar.



Fig. 51.—Mayo cystic-duct scoop.



Fig. 52.—Moore bile spoon.



Fig. 53.—Kelly gauze packer.



Fig. 54.—Mayo common-duct probe.



Fig. 55.—Mayo common-duct scoop.



Fig. 56.—Ochsner stomach clippers.



Fig. 57.—Scudder stomach clamp.



Fig. 58.—Mayo straight dissecting scissors.



Fig. 59.—Suction tube.

Fig. 60.—Balfour abdominal  
retractor.

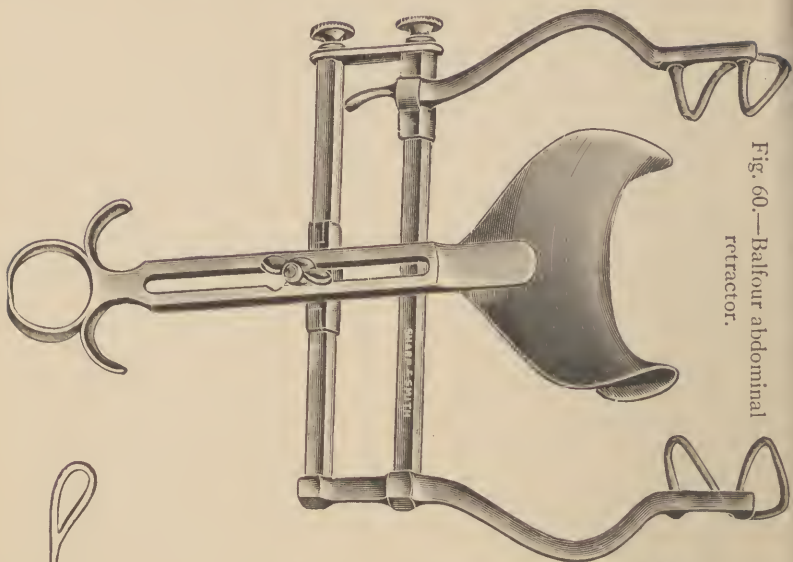


Fig. 61.—Henrotin vulsellum forceps or  
tenaculum.

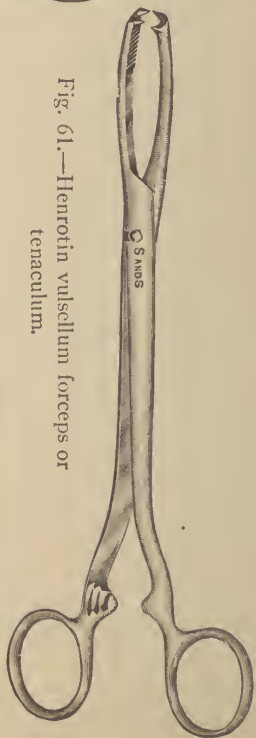


Fig. 62.—Fibroid hook.

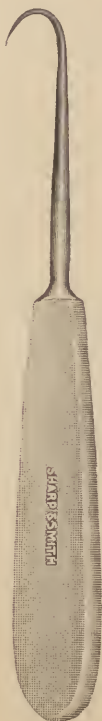


Fig. 63.—Murphy forceps.

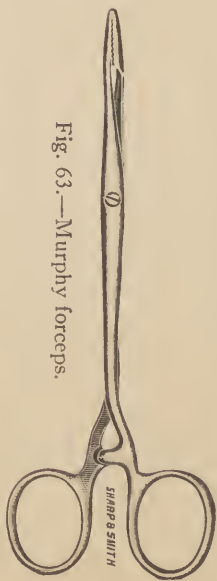


Fig. 64.—Sims uterine curet.



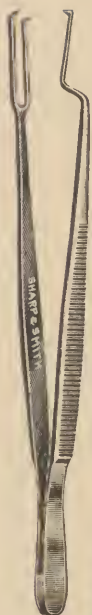


Fig. 65.—Collins suturing forceps.



Fig. 67.—Alexander bone chisel.



Fig. 68.—Bone mallet.



Fig. 69.—Kraske six-prong retractor.

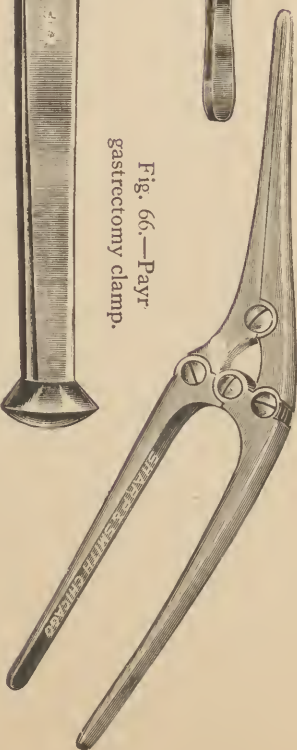


Fig. 66.—Payr  
gastrectomy clamp.



Fig. 70.—Israel retractor.

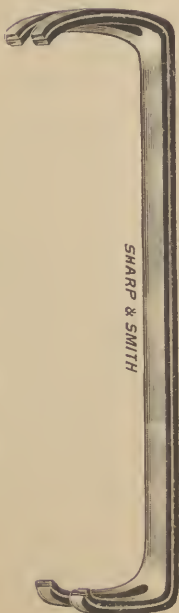


Fig. 71.—Collins two-prong retractor.



Fig. 72.—Mayo stone forceps.



Fig. 73.—Deaver abdominal retractors.

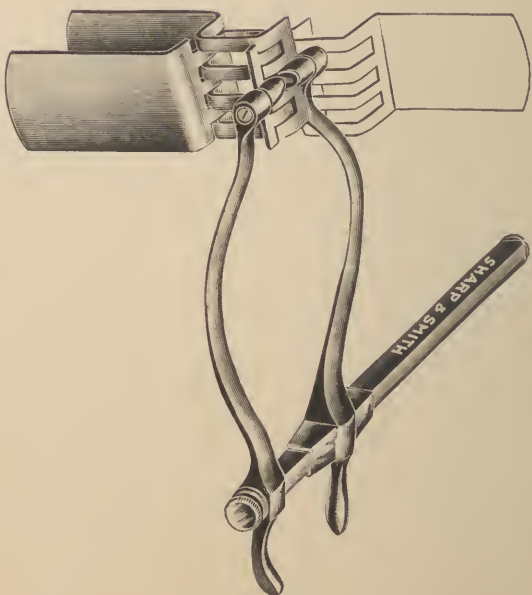


Fig. 74.—Judd-Masson retractor



Fig. 75.—Green retractor.

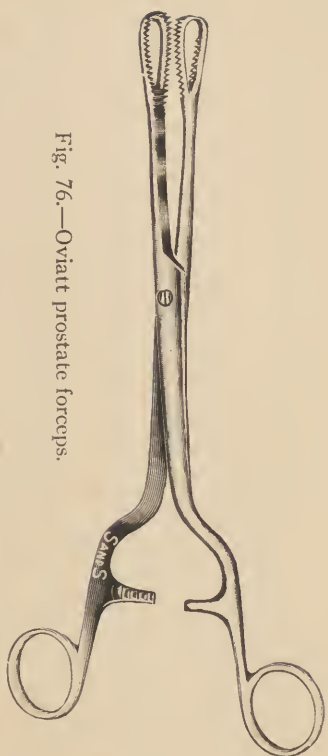


Fig. 76.—Oviatt prostatic forceps.



Fig. 77.—Pynchon tongue retractor.



Fig. 78.—Little curved lithotomy forceps.

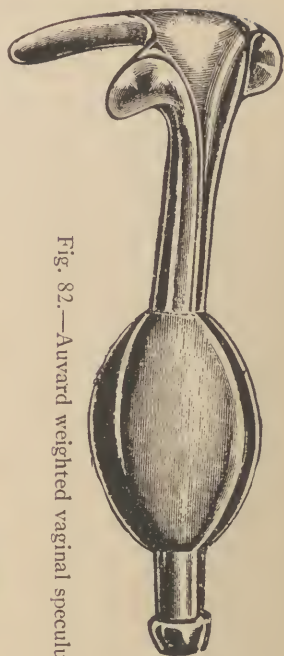
Fig. 79.—Little straight lithotomy forceps.



Fig. 80.—Bonney cutting needle.



Fig. 81.—Murphy sharp retractor.



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Fig. 82.—Auvard weighted vaginal speculum.

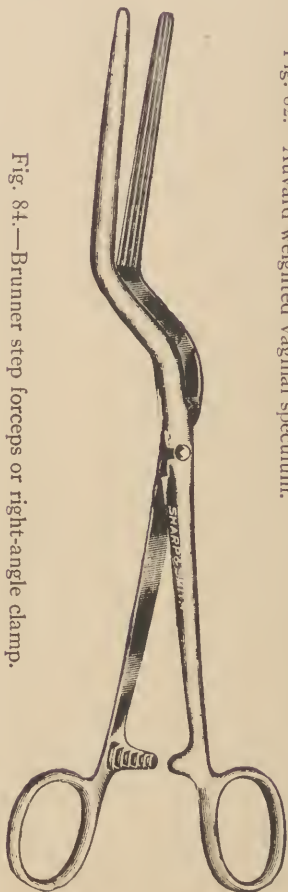


Fig. 84.—Brunner step forceps or right-angle clamp.



Fig. 83.—Ferguson double-end retractor.



Fig. 85.—Wylie dilator.



Fig. 86.—Thomas uterine curet.



Fig. 87.—Bozeman uterine douche.

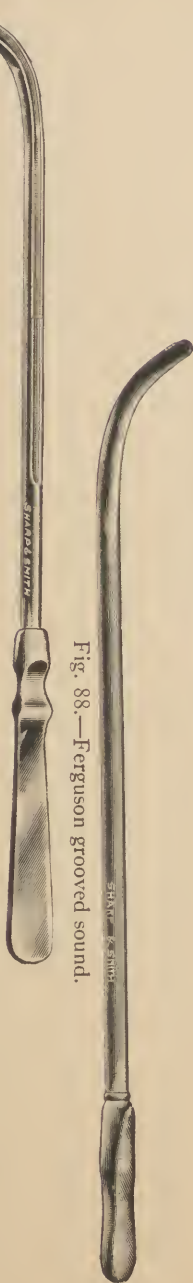


Fig. 88.—Ferguson grooved sound.

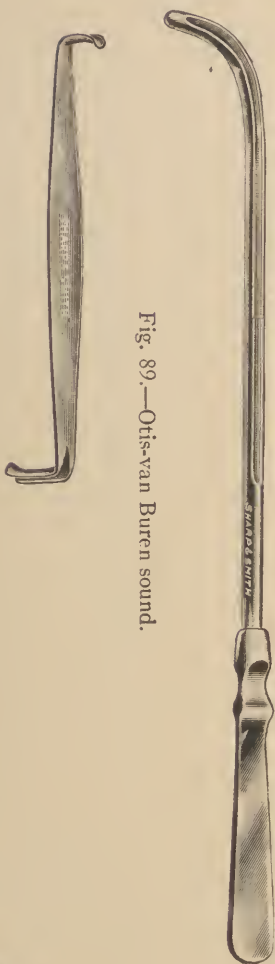


Fig. 89.—Otis-van Buren sound.

Fig. 90.—Crile double retractor.



Fig. 91.—Sands double-end retractor.

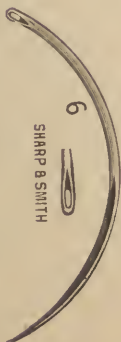


Fig. 92.—No. 6 cutting needle.



Fig. 93.—No. 1 Schroeder goiter needle.



Fig. 94.—Parker double-end retractor.



Fig. 95.—Deaver small retractor.



Fig. 96.—Liston bone-cutting forceps.



Fig. 97.—Grooved director probe.



Fig. 98.—Owen double-end bone curet.



Fig. 99.—Sims vaginal retractor.

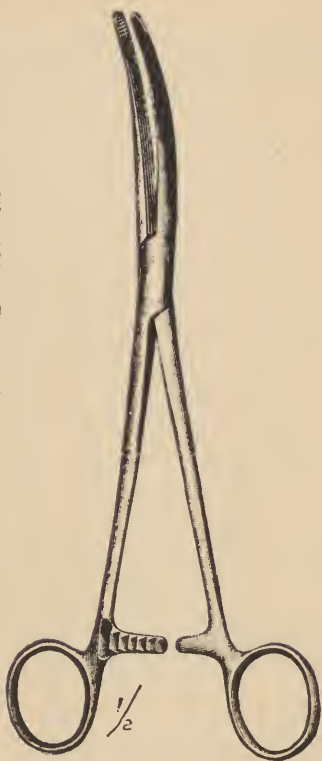


Fig. 100.—Carmalt hysterectomy clamp.



Fig. 101.—Mayo ureter knife.



Fig. 102.—Hedblom periosteal elevator.



Fig. 103.—Herzcl periosteal elevator.

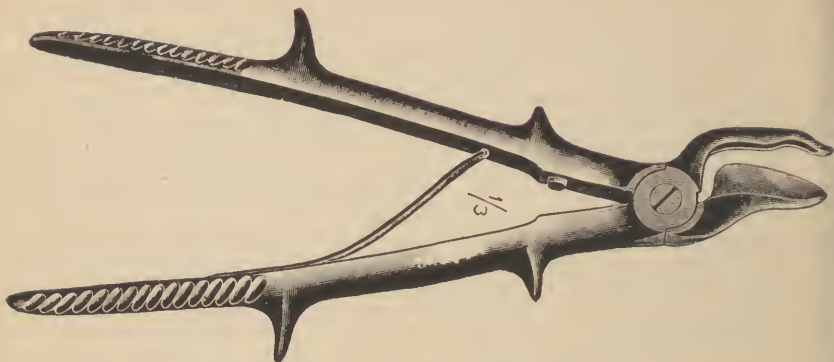


Fig. 104.—Hudson sternum shears.

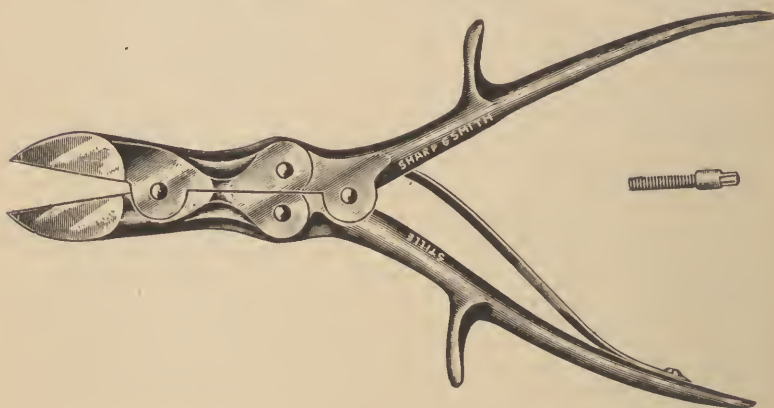


Fig. 105.—Stille-Liston cutting forceps.

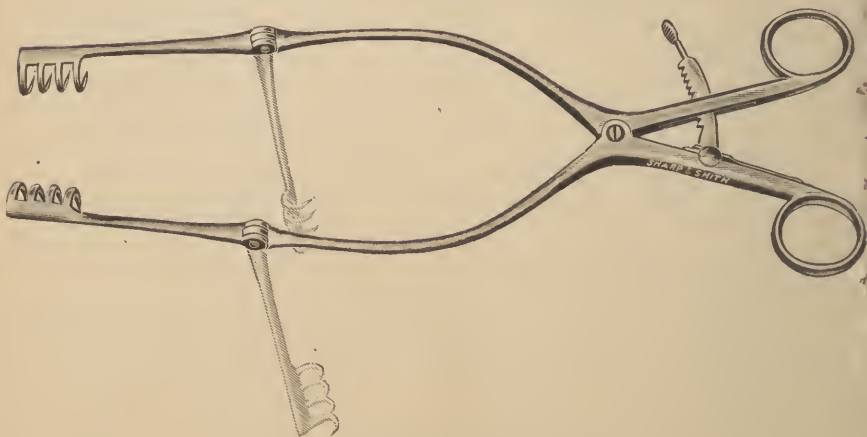


Fig. 106.—Self-retaining retractor.



Fig. 107.—Rankin's bladder retractor.



Fig. 109.—Henderson beef-bone screw-driver.

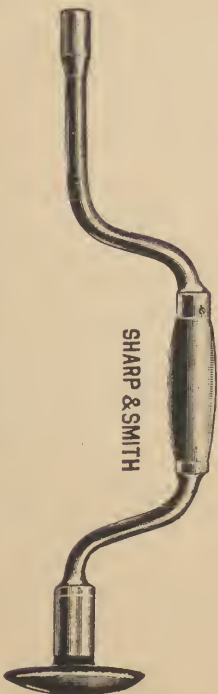


Fig. 110.—Henderson beef-bone screw-brace.



Fig. 108.—Screw and tap holder.

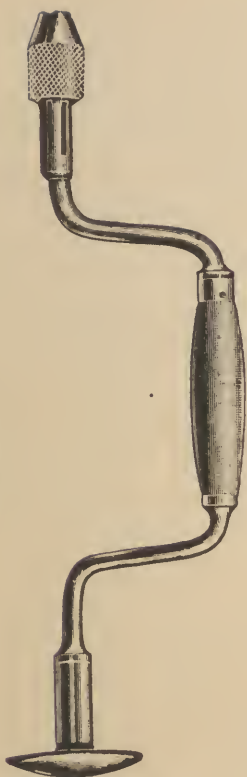


Fig. 111.—Henderson brace.



Fig. 112.—Henderson tap.



Fig. 113.—Twist drill.

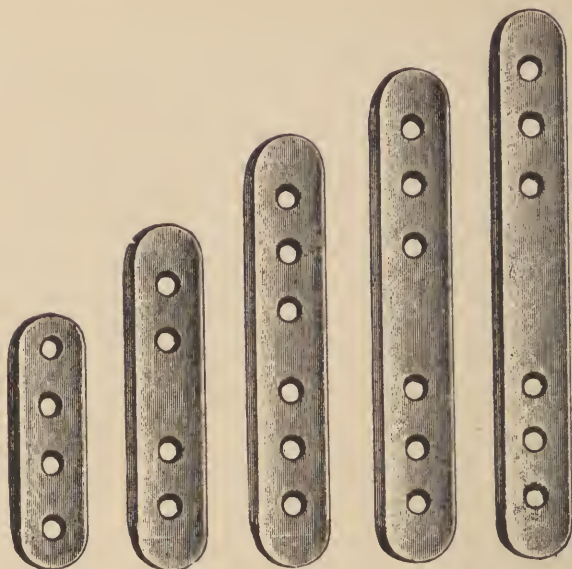


Fig. 114.—Brougham and Ecker beef-bone plates.

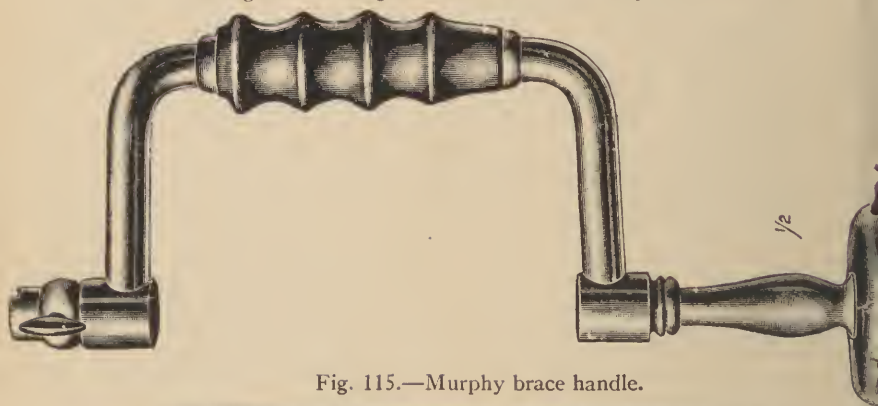


Fig. 115.—Murphy brace handle.

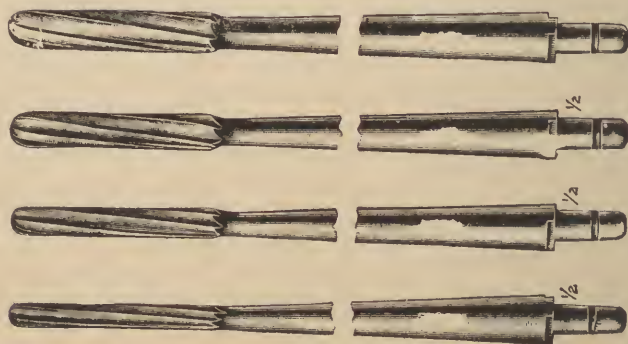


Fig. 116.—Murphy medulla reamers.

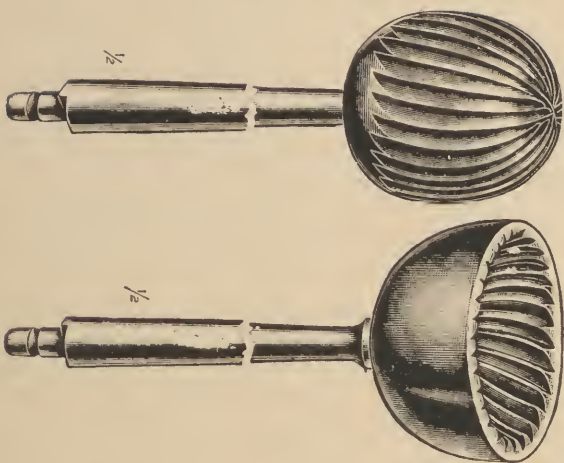


Fig. 117.—Murphy reamers.



Fig. 118.—Lane bone-holding forceps.



Fig. 119.—Hibbs cutting forceps.



Fig. 120.—Charriere bone cutting forceps.



Fig. 121.—Ferguson bone-holding forceps.



Fig. 122.—Esmarch rongeur.



Fig. 123.—Luer curved rongeur.



Fig. 124.—Parker amputating saw.

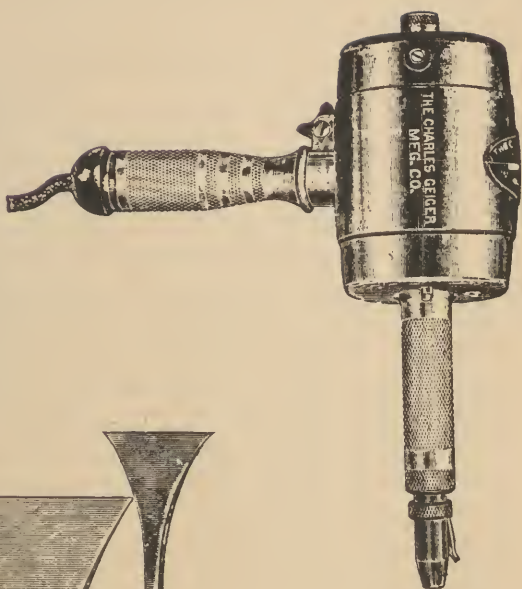


Fig. 125.—Geiger electric motor.



Fig. 126.—a, Geiger twist drill; b, Geiger twin and single saw; c, Geiger twist drill.

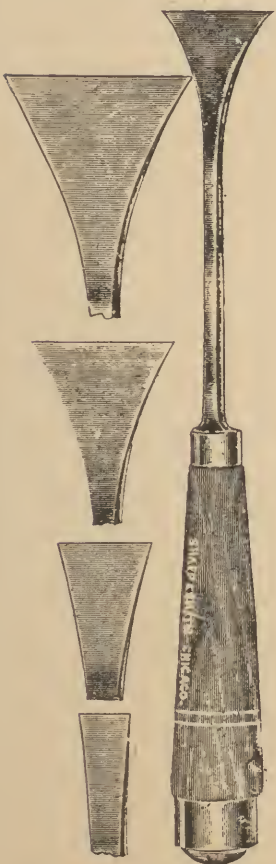


Fig. 127.—Murphy artist chisels.



Fig. 128.—Twelve-inch silver probe with eye.



Fig. 129.—Meyering mallet.



Fig. 130.—Plain periosteal raspatory.



Fig. 131.—Cheyne dry dissector.



Fig. 133.—Lane steel plate (eight-hole).

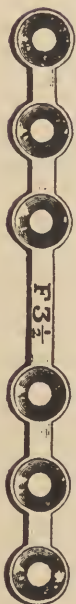


Fig. 134.—Lane steel plate (six-hole).

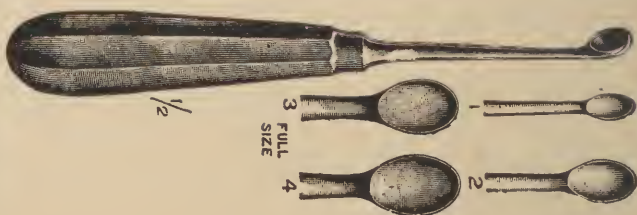


Fig. 132.—Volkman bone curet.



Fig. 135.—Lane screw driver.



Fig. 136.—Simplex screw-driver.



Fig. 137.—Parham-Martin holder and band.



Fig. 138.—a, Hand saw; b, gouge; c, chisel osteotomes.



Fig. 139.—Yankee hand drill.

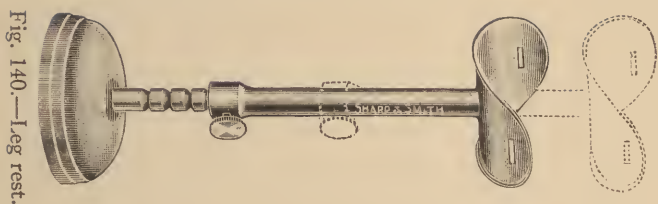


Fig. 140.—leg rest.

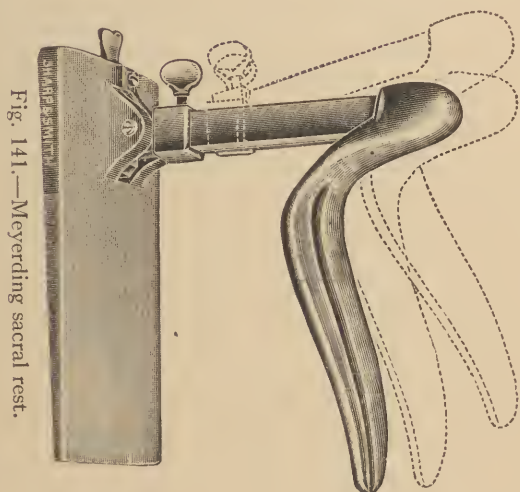


Fig. 141.—Meyerding sacral rest.

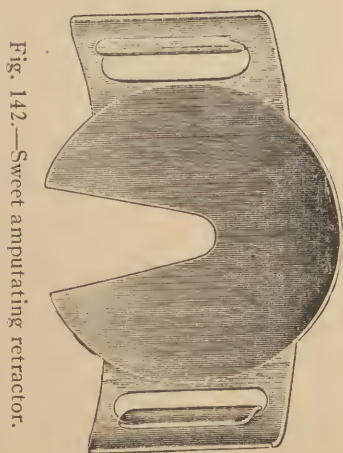


Fig. 142.—Sweet amputating retractor.



Fig. 143.—Angular bone-cutting forceps.



Fig. 144.—Electric cautery.

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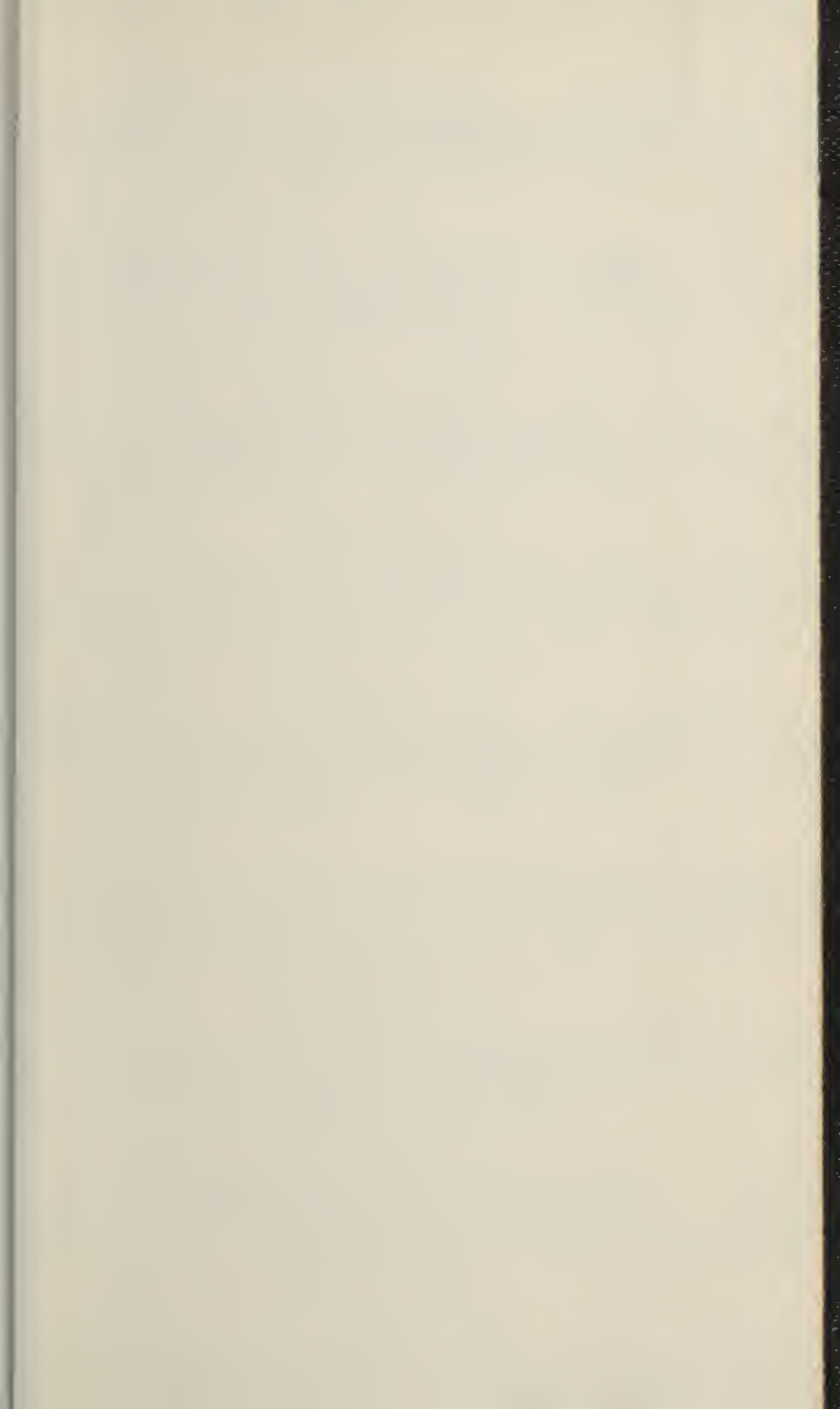
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